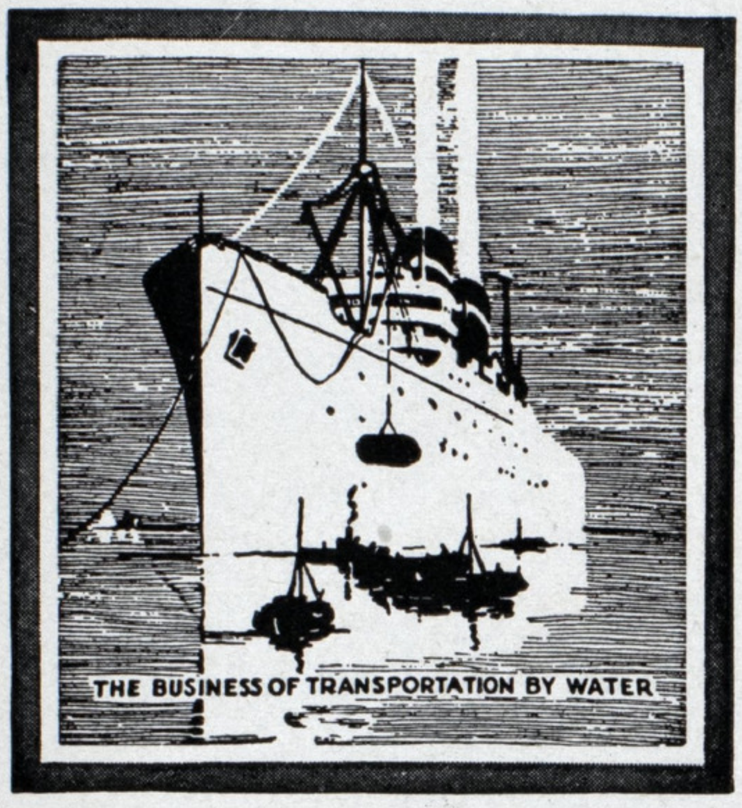
Marine Review

The National Publication Covering the Business of Transportation by Water

CLEVELAND **FOUNDED 1878** **NEW YORK**



**Published monthly by
The Penton Publishing Co.
Cleveland, Ohio, U. S. A.**

Cleveland Office, Penton Bldg.
A. H. Jansson, *Editor*
H. O. Taylor, *Advertising Manager*

Chicago Office, 1347 Peoples Gas Bldg.
L. C. Pelott
Fred B. Pletcher

New York Office, 220 Broadway,
Joseph Fuller, *Eastern Manager*
E. C. Kreutzberg
B. K. Price
H. R. Simonds

Pittsburgh Office, 507-8 Oliver Bldg.
S. H. Jasper
W. G. Gude

San Francisco Office, 681 Market St.
N. C. Nourse

Washington, D. C. Office,
1020 National Press Building
L. M. Lamm

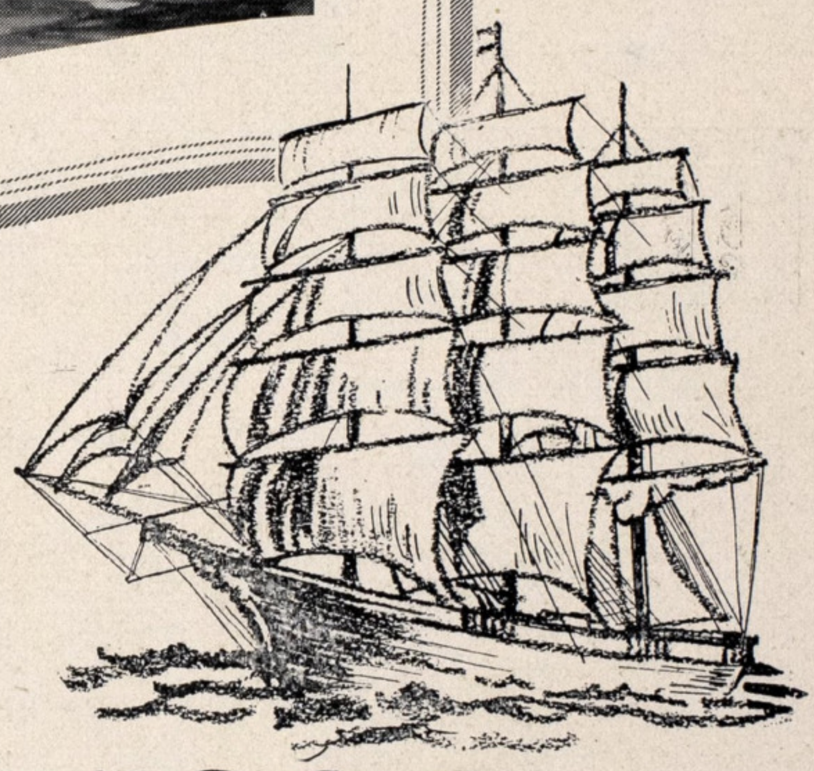
London Office, Caxton House
Westminster, S. W. 1
Vincent Delport

CONTENTS

Vol. 61 **April 1931** *No. 4*

MARINE REVIEW is a member of the Audit Bureau of Circulations, Associated Business Papers Inc. and the National Publishers Association. Entered at the Post Office at Cleveland, Ohio, as Second Class Matter, under the act of March 3, 1879. Copyright 1931 by The Penton Publishing Co., Cleveland, O.

Subscription United States and its possessions, $3 per year; Canada $4.00; Great Britain and other Foreign Countries, £1:0:0. Single copies 35 cents. Back numbers over three months 50 cents. Cable addresses: Penton, Cleveland, and Irotrapen, London.



Marine Progress

shown by

DISTINCTIVE SHIPS

&

Largest American-built Yacht—Twin Screw Turbine Electric—Built by Bath Iron Works Corp., 1930, for J. Pierpont Morgan

American Shipbuilding Sets New Mark

Now Greater Than Before the War

MEASURED by direct returns the merchant marine act of 1928, known as the Jones-White law, has had a very stimulating effect on shipbuilding in the United States. The results may be said to have exceeded anticipation. On March 1 according to a survey made by the shipping board 26 vessels for foreign trade, costing in the aggregate $116,838,324, were under construction in American shipyard and in addition five vessels are being reconstructed for overseas trade at a cost of $8,838,850. The majority of these vessels will be operated in services to foreign ports covered by ocean mail contracts awarded under the terms of this beneficial law. Loans amounting to 75 per cent of the construction cost have been authorized by the shipping board. Of the total loans authorized for this program of new shipbuilding amounting to $93,558,741, the sum of $10,316,498 has already been advanced and the average state of completion is 33 per cent. In a statement made March 18 to Col. Arthur Woods, chairman of the President's emergency committee for employment, H. G. Smith, president of the National Council of American Shipbuilders said in part:

"The general level of the shipbuilding has held up well during the depression. The construction volums now under way is greater than that of a year ago.—

"Therefore most American shipbuilders have been able to contribute materially to the maintenance of employment. Their program has been aided by an increasing volume of loans to shipowners from the shipping board, facilitating private construction under a plan of repayment as the work progresses. Loans during 1930 were about $24,000,000 and the estimate for 1931 more than doubles this amount with $51,000,000 worth of work contemplated under the federal plan." It is interesting to note according to a memorandum issued by the commerce department's transportation division that the shipyards of the United States on Dec. 31, 1930 were building 85,000 tons more than they were before the war, while world construction fell off 836,000 gross tons from the total just before the war. During the quarter ended Dec. 31, 1930 American shipyards showed a gain of about 20,000 gross tons. Comparison of the volume of shipbuilding during the last two quarters of 1930 show 232,030 gross tons for the United

Motive Power Compared—Two Years

Types	No. 1930	No. 1929	Per Cent 1930	Per Cent 1929
Steam reciprocating coal burner	20	18	15.4	12.4
Steam reciprocating oil burner	16	15	12.3	10.3
Steam turbine coal burner	0	1	0.0	0.7
Steam turbine oil burner	15	15	11.5	10.3
Diesel engine direct drive	40	52	30.8	35.9
Diesel engine electric drive	20	28	15.4	19.3
Turbine electric oil burner	18	14	13.9	9.7
Turbine electric coal burner	1	2	0.7	1.4
Totals	**130**	**145**	**100.0**	**100.0**

Recapitulating for Primary Power

Types	No. 1930	No. 1929	Per Cent 1930	Per Cent 1929
Steam—As primary power	70	65	53.8	44.8
Diesel—As primary power	60	80	46.2	55.2
Totals	**130**	**145**	**100.0**	**100.0**

Recapitulating for Power at Propeller

Types	No. 1930	No. 1929	Per Cent 1930	Per Cent 1929
Steam—Direct and gears	51	49	39.2	33.8
Diesel—Direct drive	40	52	30.8	35.9
Electric—Steam and diesel	39	44	30.0	30.3
Totals	**130**	**145**	**100.0**	**100.0**

Recapitulating for Fuel

Types	No. 1930	No. 1929	Per Cent 1930	Per Cent 1929
Steam—Burning coal	21	21	16.1	14.5
Steam—Burning fuel oil	49	44	37.7	30.3
Diesel—Diesel oil as fuel	60	80	46.2	55.2
Totals	**130**	**145**	**100.0**	**100.0**

States for the period ending Dec. 31, 1930 and 212,974 for the three months ending Sept. 30 last. The United States is now second to Great Britain and Ireland in shipbuilding. During 1930 for the first time in the history of world shipbuilding according to Lloyds Register of Shipping, the tonnage of motorships launched exceeded for all other types of vessels combined. Another feature of the 1930 returns is the increase in the output of the shipyards of the United States with almost *double* the total for 1929. Against the American gain of 120,000 gross tons for last year a decline of 44,000 gross tons was reported for Great Britain and Ireland, while for all other countries combined, there was a gain of about 20,000 tons. For merchant vessels of 100 gross tons and upwards the United States launched 246,687 gross tons in 1930 compared with 126,063 gross tons in 1929.

On Feb. 1, 1931 (the latest for which figures are available) according to the department of commerce American shipyards were building or under contract to build 27 seagoing steel steam or motor vessels of 1000 gross tons and over aggregating 341,972 gross tons and 10 steel, steam or motor vessels from 100 to 999 gross tons aggregating 3280 gross tons making a grand total of 37 steel steam or motor vessels of 345,252 total gross tons.

The effect of the merchant marine act of 1928 is clear. It has definitely stimulated shipbuilding in the United States. While practically all the ships so far laid down have been additions to wholly American built fleets, the recent laying of the keel for the first of the three ships ordered by the United Mail Steamship Co. a subsidiary of the United Fruit Co. from the Newport News Shipbuilding & Dry Dock Co., might properly be termed an epoch in American Shipbuilding and another instance of the beneficial effect on domestic shipbuilding and shipowning industries of this law. The greater significance of this keel laying lies in the fact that it represents practically the first American built addition to the largest fleet of fruit carriers in the world. In all, six sister ships, three at Newport News and three at the Fore River plant of the Bethlehem Shipbuilding Corp. are to be added to this fleet.

In speed and size, the new vessels will exceed all the other vessels of the fleet except that two are longer. The length overall will be 447 feet; the beam, 60 feet; the depth to upper deck, 34 feet 9 inches and displacement at a draft of 24 feet 6 inches will be about 11,000 tons. At normal service draft these vessels will have a speed of about 18 knots. They will be twin screw with turbine electric main drive, developing 10,500 shaft horsepower. Steam will be supplied at 350 pounds, superheated to about 250 degrees Fahr. Refrigeration and ventilation of cargo spaces will receive special attention as fruit carrying, particularly bananas, is to be the principal occupation of the vessels. However, in keeping with the fine traditions built up by the owning company, attractive accommodations will be provided for about 100 first class passengers on the upper, bridge and promenade decks. Here then is the case of a fine shipbuilding order going to American yards, instead of to foreign builders because of legislation intended to promote an American merchant marine.

As in former years, this annual shipbuilding review is intended to present the true facts of steel shipbuilding in the United States in all types of merchant vessels from 100 gross tons and up, built of steel and with power in them. The first step in such a review is to list all the vessels coming within this category that were under construction in any stage during the calendar year 1930. This listing will be found on pages 64, 65 and 66. These vessels have been arranged in two groups alphabetically; the first including all those

ANALYSIS OF AMERICAN MERCHANT SHIPBUILDING—1930
COMPILED BY MARINE REVIEW

TYPES OF VESSELS	NO	RECIP. COAL	RECIP. OIL	TURB. OIL	DIESEL OIL	DIES. ELEC. OIL	TUR. ELEC. OIL	TUR. ELEC. COAL
PASSENGER-OCEAN	23			11	1		11	
FREIGHTER-LAKES	2	2						
FREIGHTER-CANAL	1				1			
TANKER-OCEAN	16		1	4	11			
TANKER-LAKES	1		1					
TANKER-COAST, BAYS	16		1		10	5		
FERRY-HARBORS	6	1	2		1	2		
CARFERRY-LAKES	3	2						1
TOWBOAT-HARBORS	16	4	3		4	5		
TOWBOAT-RIVERS	19	10	4		2	1	2	
FISHING-OCEAN	6				6			
FIREBOAT-HARBORS	1	1						
DREDGE-RIVERS	3		1		2			
SPECIAL-OCEAN	10					5	5	
SPECIAL-BAYS, RIVERS	7		3		2	2		
TOTALS	130	20	16	15	40	20	18	1

Distinctive Ships---Where to Find Them

Passenger Ships

Freighters

Ferries

Tankers

Tankers (Continued)

Towboats

Special Types

See Pages 64, 65, 66 for Complete Shipyard Record

that were completed within the calendar year and the second, those that were contracted for or were under construction in any stage without being completed in that year. This listing, giving the name of the vessel or the hull number, the name of the shipyard, the owner, the principal dimensions and type of machinery and service, gives a definite picture of merchant shipbuilding in the United States.

From those vessels which were completed during this period, have been selected 25 of the most distinctive and representative, which due to sister ships include a total of 48. The vessels so selected and called distinctive ships are illustrated and described in detail, one to a page. In this way there is presented a striking gallery of new ship construction, showing by actual examples just what the trend has been in type and power.

An analysis of the complete list of steel powered vessels of over 100 gross tons or 100 feet in length that were under construction in any stage in American shipyards during 1930 bring out some interesting results as shown in the accompanying tables. In all, 130 vessels of approximately 520,313 gross tons are included in this list as compared with 145 vessels of approximately 427,000 tons for the year 1929 and 92 vessels for the year 1928, 105 for 1927 and 121 for 1926. The number, it will be noted, has fallen off from the year 1929, but the gross tonnage is considerably greater, showing an increase of approximately 22 per cent. The listing of vessels under construction is of course not complete, but it is less, not more than the actual. The listing is as accurate and complete as possible, by returns from all shipyards of any size and from practically all of the smaller yards. Every other available authoritative source has been carefully scrutinized for information.

As in other years an analysis by actual count has been made of types of vessels and the power used. The table on page 13 segrates all of the 130 vessels into classes and types of power giving the number of each. No less than 23 ocean going vessels carrying passengers are listed; 16 ocean going tankers; 16 coastwise tankers; 16 towboats for harbors; 19 towboats for rivers; 10 special types for ocean service, etc. No yachts and no naval ships are included. Government vessels of merchant type, such as coast guard cutters, lightships, however, are included. It is interesting to note that of the 130 vessels listed, 20 are powered with steam reciprocating engines and coal burning boilers; 16 with steam reciprocating engines and oil burning boilers; 15 with steam turbine geared drives and oil burning boilers; 40 with diesel engines direct connected; 20 with diesel electric drive; 19, steam turbine electric drive, 18 of which have oil burning boilers and one coal burning boiler mechanically stoker fired.

In the table on page 12 the motive power of the 130 vessels is compared in number and percentage with the vessels in the same category under construction during 1929. This comparison of all vessels from the smallest river boats and tugs to the large ocean liners, taken as individual units regardless of the size of the proplusion machinery, brings out some interesting facts. For the time being the decline in the use of steam reciprocating engines has come to a halt. Going back to the year 1925, over half of all the vessels listed or 52.4 per cent were fitted with steam reciprocating engines. For 1926 the percentage was 41.3; for 1927 it was 40 per cent; for 1928, it was 28.2 per cent; for 1929 only 22.7 per cent and for 1930, an increase to 27.7 per cent, only slightly less than for the year 1928. No permanent comeback for the steam reciprocating engine as an important factor in ship propulsion is looked for.

It should be emphasized that the comparisons given are based on units of individual vessels from the smallest to the largest and in so doing the power and importance of the main propulsion installations are not considered. For this reason, in the accompanying table on page 14 is presented an analysis of the power and gross tonnage of the vessels listed on pages 64, 65 and 66. This analysis shows that for the year 1930 there were 19 turbine electric vessels of 137,186 gross tons of a total horsepower of 188,340 as compared with 16 vessels in this category of a total of 110,553 gross tons and a total horsepower of 151,280 for 1929. Both the average gross tonnage and the average horsepower for 1930 is somewhat greater. The biggest difference, however, is in vessels powered with turbine gears. In 1930 there are 15 such vessels of 200,858 gross tons and 204,270 total horsepower giving an average gross tonnage of 13,391 and an average horsepower of 13,618 as compared with 16 turbine geared vessels listed for 1929 of an average gross tonnage of 7745 and an average horsepower per vessel of 7290. The turbine electric in average size is pulled down considerably by a few installations of small power whereas the turbine gears are boosted up by including the two 30,000-ton transatlantic liners.

The average size of vessel and average horsepower per vessel for reciprocating steam engine compares fairly closely with 1929 especially in average horsepower which for 1929 was 1480 as compared with 1415 for 1930. The average gross tonnage per vessel with reciprocating steam engines in 1929 was 2055 as compared with 1416 for 1930.

The most interesting comparison is the standing of the diesel engine direct connected as power. For 1929 there were 52 vessels in this category with a total gross tonnage of 108,139 and a total horsepower of 53,014 giving an average gross tonnage per vessel of 2080 and average horsepower per vessel of 1020. Progress in the use of the internal combustion engine for marine propulsion is indicated by Lloyds reports that the total tonnage for 1930 of vessels fitted with this power exceeded by over 330,000 tons the world's output of steam tonnage.

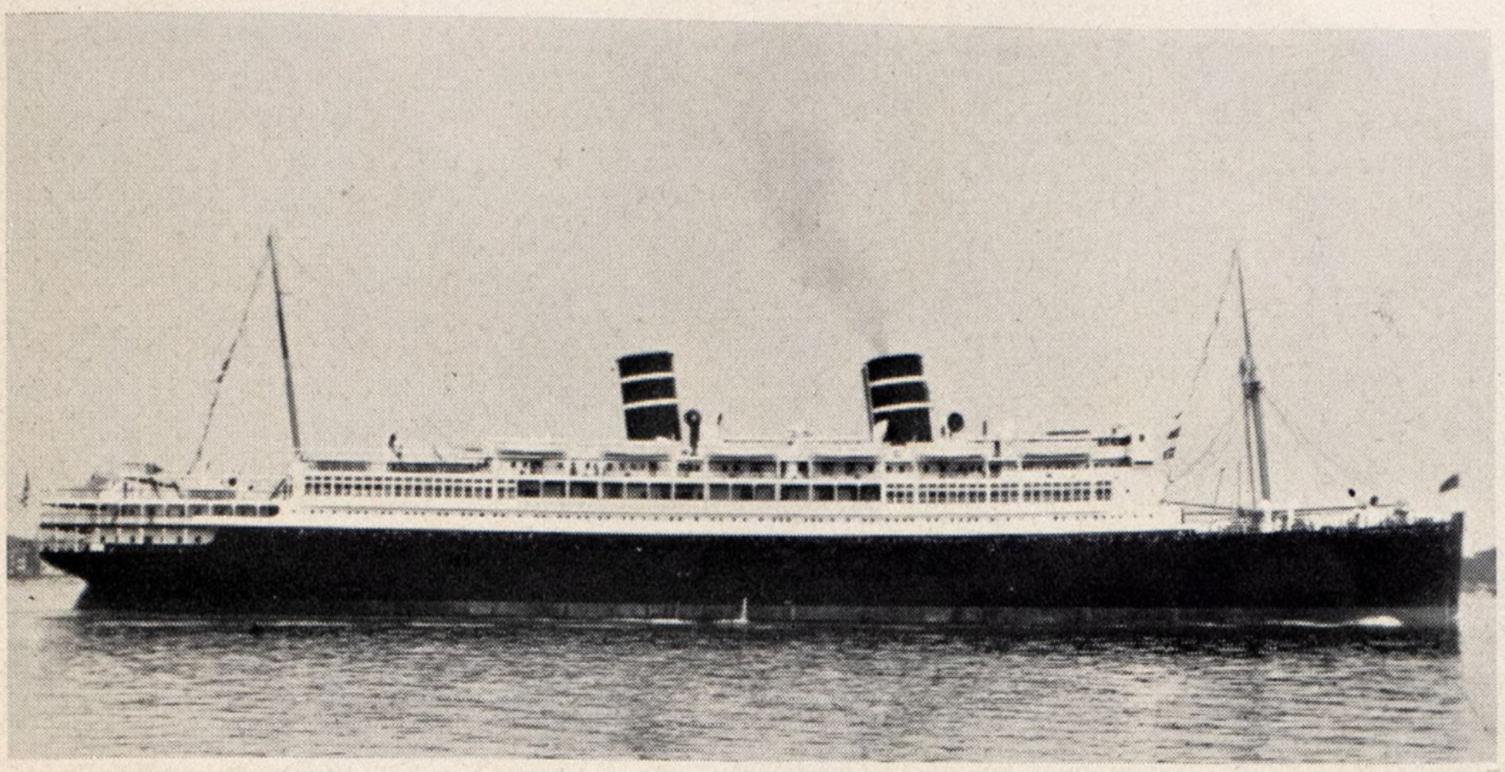
In spite of this world showing our analysis shows that in total gross tons and total horsepower, the diesel engine plays no such part in new construction in the United States. The proportion of units so fitted in 1929 was shown to be 55.2 per cent but according to our present analysis this has dropped to 46.2 per cent for 1930. Of the total gross tonnage of 520,313 for the 130 vessels listed as shown in the table on page 14 only 131,303 gross tons are fitted with diesel drive which represents 25.1 per cent. Of the total horsepower for the 130 vessels listed in the same table, 508,052, only 64,495 horsepower is in diesel engines.

Nothing could more clearly demonstrate the position of the diesel engine in marine propulsion for larger vessels in the present shipbuilding program of the United States. But this significant fact must be considered, that not a single ocean freight ship is included in the shipbuilding now going on in the United States and that on the other hand many larger ocean going passenger vessels are under construction and that for this type the proportion of diesel engines shown in Lloyds returns for world construction would not hold even in Europe.

Analysis of Power and Gross Tonnage of Vessels Listed on Pages 64-65-66

Type of Power	Number of Vessels	Total Gross Tons	Total Horsepower	Average Gross Tons	Average Horsepower
Turbine Electric.	19	137,186	188,340	7220	9912
Turbine Gears...	15	200,858	204,270	13391	13618
Reciprocating...	36	50,966	50,947	1416	1415
Diesel Electric...	20	10,234	10,165	512	508
Diesel Direct....	40	121,069	54,330	3027	1358
Totals.....	130	520,313	508,052	4002	3908

MORRO CASTLE—Oriente—Passenger—Ocean—Twin Screw—Electric



Name—MORRO CASTLE
Owner—Atlantic Gulf & West Indies Co.
Builder—Newport News S. B. & D.D. Co.
Naval Architect—Theodore E. Ferris
Launched—March 5, '30; comp. Aug. 15, '30
Sister Ship—ORIENTE; launched, May 15, '30; completed, Nov. 21, '30
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 508 feet; length between perpendiculars, 482 feet; breadth molded, 70 feet 9 inches; depth molded to shelter deck at side, 39 feet; draft, 27 feet; displacement loaded, 15,870 tons; gross tonnage, 11,300; net tonnage, 5700; passenger capacity, first class, 437; tourist class, 95; cargo capacity, 6700 tons and in cubic feet, 335,000; bunker fuel oil capacity in tons, 1838; speed at sea, 20 knots.

MACHINERY PARTICULARS

Main Engines—Two, General Electric turbine generating units and two electric motors direct connected to propellers. Total horsepower, 18,000 at 146 revolutions per minute. Machinery and vessel descibed in MARINE REVIEW, for September, 1930. The generators are alternating current and each of 6000 kilowatts capacity.

Boilers—Six, Babcock & Wilcox watertube marine boilers with a total heating surface of 43,008 square feet and total superheating surface of 3444 square feet; working pressure, 300 pounds; 200 degrees Fahr. superheat; fuel, oil.

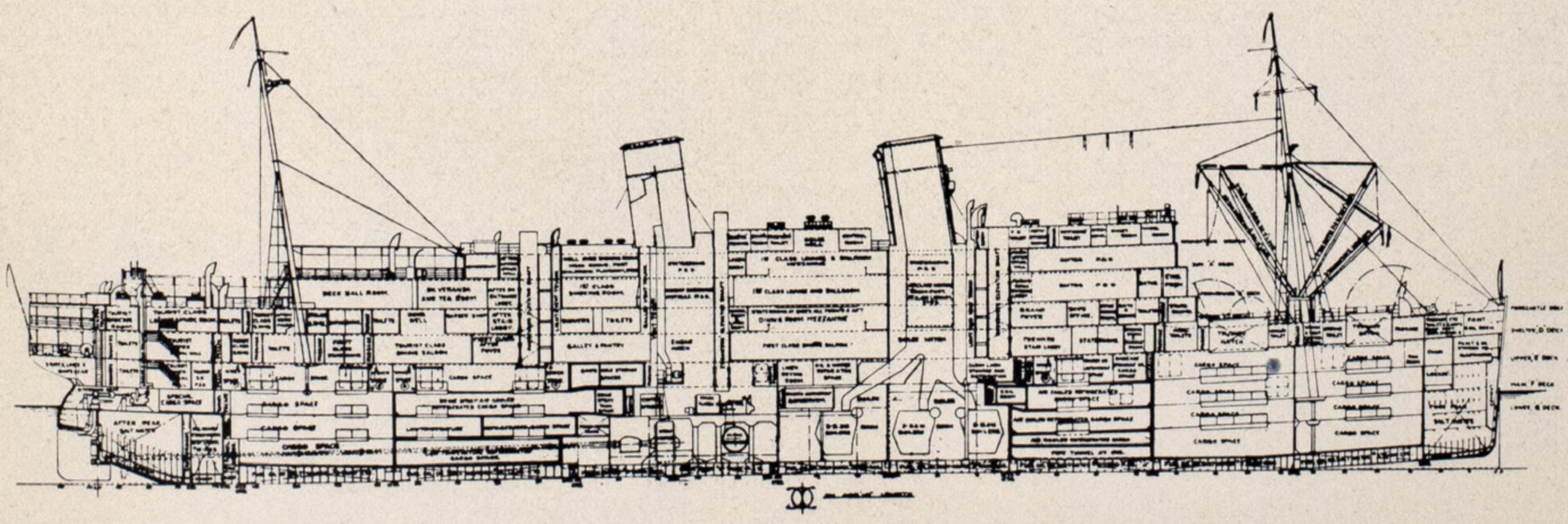
DESCRIPTION

Fast, luxurious liners for the New York-Havana passenger and high class freight service. A modern propelling plant is combined with hull construction, public rooms and passenger quarters of the highest order, particularly suitable for this service. In building these two vessels the questions of quality and suitability were uppermost in mind.

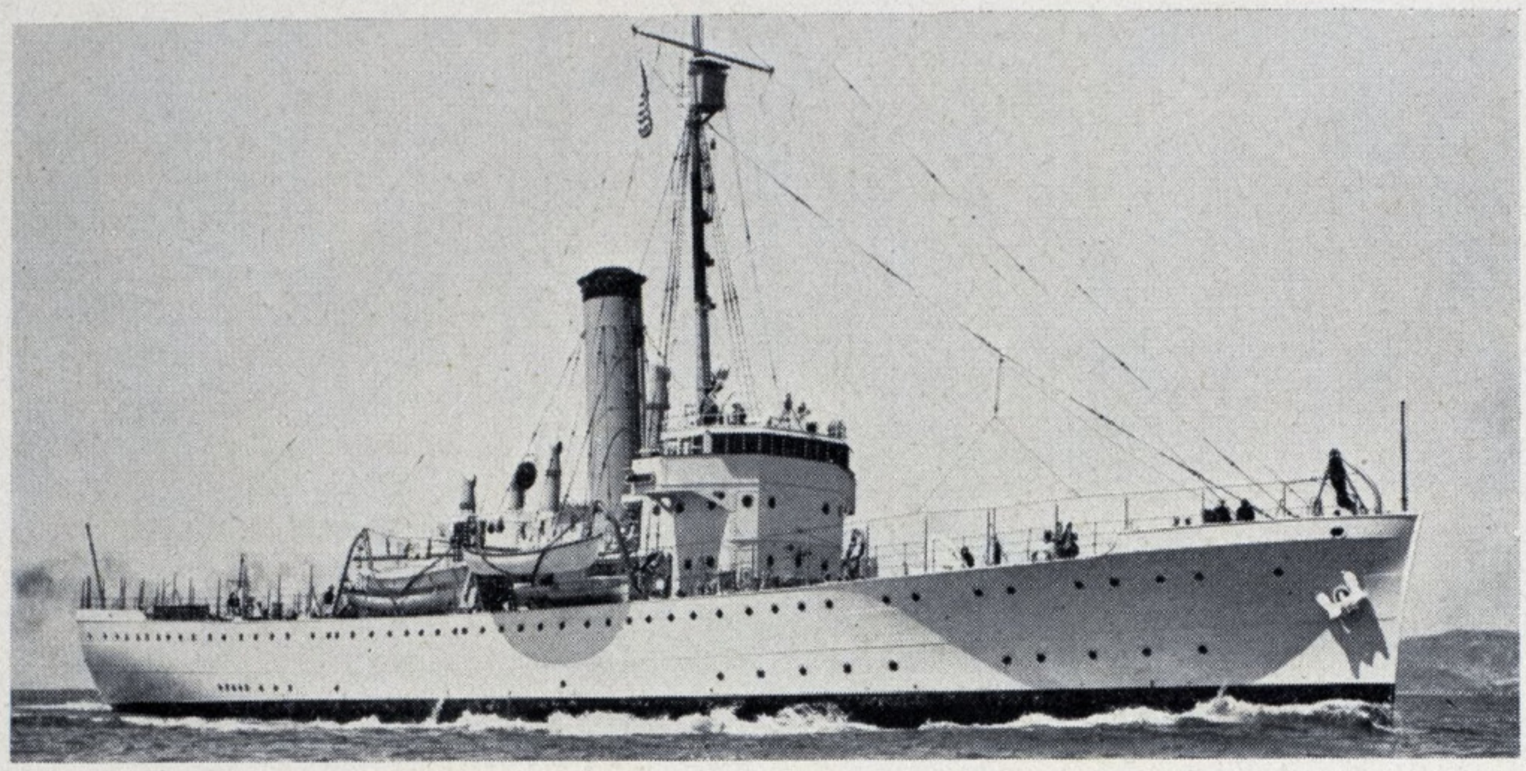
Auxiliary Generators—Three, turbine, General Electric.

AUXILIARY EQUIPMENT

Pumps—Worthington Pump & Mach. Corp.
Windlass—American Engineering Co.
Winches—Lidgerwood Mfg. Co.
Steering Engine—American Engineering Co.
Refrigeration—Brunswick-Kroeschell—G. E.
Navigating Equipment—Gyro compass, gyro pilot, searchlight, recorder—Sperry
Blowers and Fans—B. F. Sturtevant Co.
Chain & Anchors—Baldt
Refrigeration—Brunswick-Kroeschell Co.
Clock Equipment—Standard Elec.—Chelsea
Telegraphs—Chas. Cory Corp.
Watertight Door Equip.—Cutler Hammer
Marine Hardware—The Dayton Mfg. Co.
Feed Water Heater—Davis Engineering Corp.
Evaporator—Distiller-Davis Eng. Corp.
Soot Blowers—Diamond Power Specialty
Pump Drives—(Turbine) B. F. Sturtevant Co.
Batteries—Electric Storage Battery Co.
Reducing, Regulating Valves—Foster Eng. Co.
Windows—Kearfott Engineering Co.
Radio Equipment—Radiomarine Corp.
Deck Covering—Selby, Battersby & Co.
Oil Purifiers—Sharples Specialty Co.
Lighting Fixtures—Sterling Bronze Co.
Depth Finder—Submarine Signal Co.
Life Saving Equip.—Welin Davit & Boat Corp.
Galley Equip. (Electric)—Westinghouse
Motors and Controls (Deck)—Westinghouse



SARANAC AND CLASS—Coast Guard Cutter—Single Screw—Electric



Name—SARANAC
Owner—United States Coast Guard
Builder—General Eng. & Dry Dock Co.
Naval Architect—United States Coast Guard
Launched—April 12, '30; comp. Sept. 23, '30
Sister Ships—ITASCA, SEBAGO and SHOSHONE; respectively, launched Nov. 16, '29; Jan. 15, '30; Sept. 11, '30; and completed, July 1, '30; Aug. 20, '30; Jan. 7, '31

HULL PARTICULARS

Length over all, 250 feet; length between perpendiculars, 236 feet; breadth molded, 42 feet; depth molded, 26 feet 10 inches; draft 15 feet; displacement loaded, 2000 tons; bunker fuel oil capacity, 90,000 gallons; cruising radius, 8000 miles; service speed 16 knots.

MACHINERY PARTICULARS

Main Engine—One, steam turbine direct connected to an a.c. generator. A synchronous motor direct connected to the propeller shaft. The turbine of impulse reaction type suitable for operation with 260 pounds of steam and 175 degrees superheat and 28½ inches of vacuum at full speed of 3600 revolutions per minute will develop 3220 horsepower at the motor. Both turbine and generator designed and built by Westinghouse Electric & Mfg. Co.

Boilers—Two Babcock & Wilcox water tube marine boilers with total heating surface of 6336 square feet and total superheating surface of 696 square feet; working pressure 265 pounds; superheat, 175 degrees Fahr.; fuel, oil.

Main Generator—One a.c. of revolving field type, with an output of 2600 kilowatts at 3600 revolutions per minute and 2300 volts, direct connected to turbine.

Main Motor—One, 3220 shaft horsepower of revolving field, salient pole, synchronous type, 3 phase, 60 cycles, 44 poles at 163.5 revolutions per minute direct connected to propeller shaft. Built by Westinghouse Electric & Mfg.

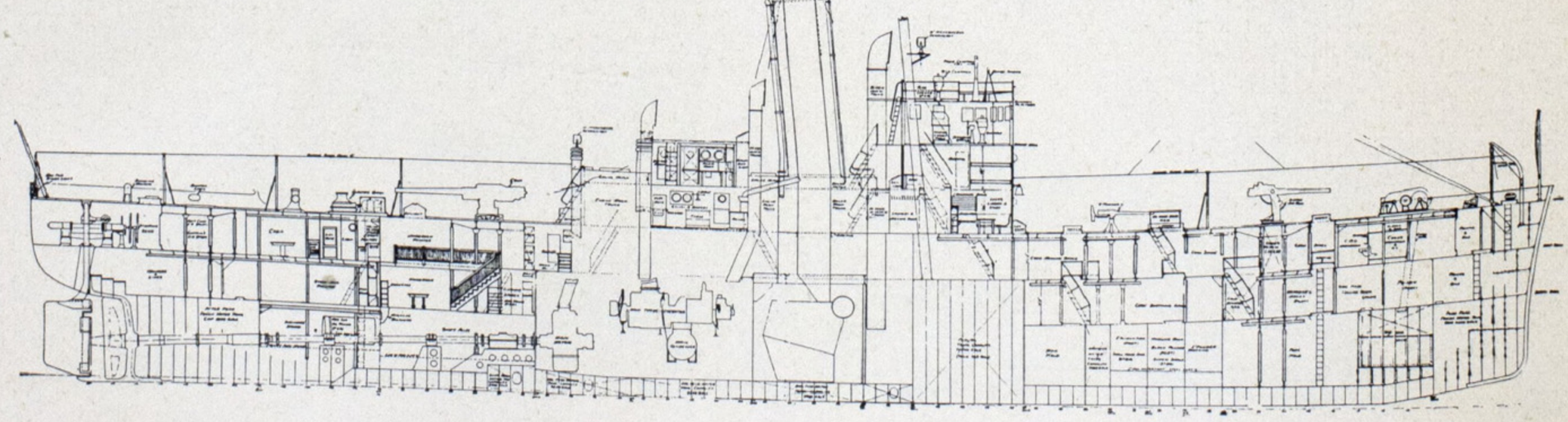
Auxiliary Power—Electric current for auxiliary power, excitation and lighting furnished by four generating sets; three turbine driven and one driven by an a.c. induction motor. The direct current generator at 240/120 volts is for excitation only. The a.c. generator rated at 187.5 k.v.a., 240 volts will supply all current for motor driven auxiliaries and for lighting. This equipment all Westinghouse.

DESCRIPTION

This vessel is one of ten modern seagoing cutters for the United States coast guard, comprising a fleet superior to any in the world for its purpose. With commendable enterprise the technical staff of the coast guard has done everything possible to fully utilize the developments of marine engineering progress and has thus rendered the entire industry a real service.

AUXILIARY EQUIPMENT

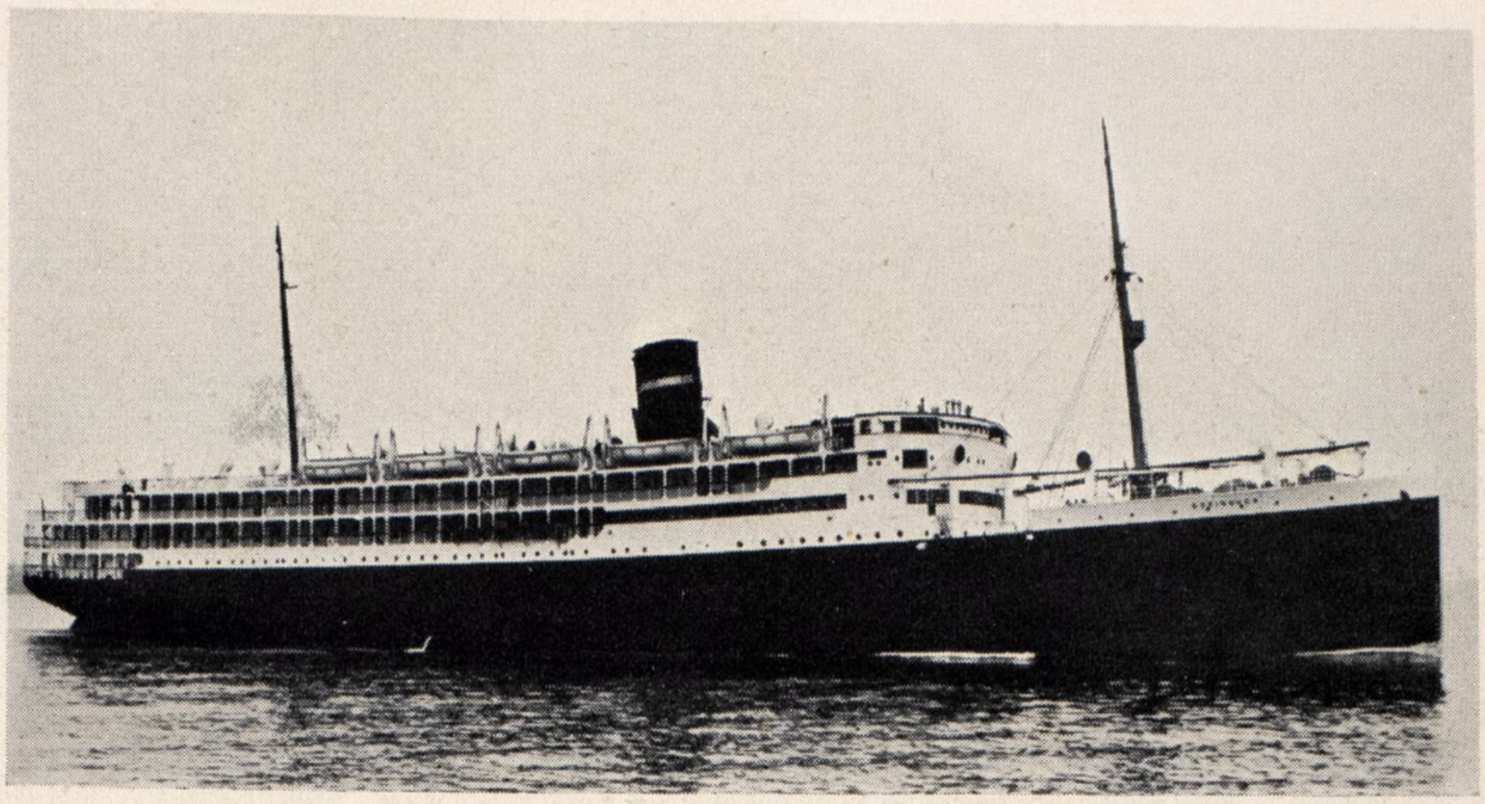
Pumps—Warren Steam Pump Co.
Windlass—Electric—American Engineer. Co.
Capstan—Electric—American Engineer. Co.
Steering Gear—Electro-Hydraulic-Hele-Shaw Pump. American Engineering Co.
Propeller—Hyde Windlass Co.
Induced Draft Fan—Sturtevant
Anchors—Baldt Anchor, Chain & Forge Co.
Oil Purifiers—De Laval Separator Co.
Valves & Fittings—The Wm. Powell Co.
Revolution Counters—Cummings Mach. Wks.
Soot Blowers—Diamond Power Specialty
Gyro Compass Equipment—Sperry
Searchlights—Sperry
Windows—Kearfott Engineering Co.
Davits—Welin Davit & Boat Corp.
Engine Room Telegraphs—Chas. Cory Corp.
Feed Water Heater—Davis Engineer. Corp.
Evaporator—Distiller—Davis Engineer. Corp.
Fuel Oil Heaters—Davis Engineering Corp.
Air Compressor—Westinghouse Air Brake Co.
Galley Equip.—Westinghouse Elec. & Mfg. Co.
Air Ejectors—Westinghouse Elec. & Mfg. Co.
Electric Motors and Controls—Westinghouse Electric & Mfg. Co.



BORINQUEN—Passenger—Ocean—Single Screw—Turbine

DESCRIPTION

Single screw passenger and freight steamer for service between New York and Porto Rico, similar to the S. S. COAMO, built in 1925 for the same owner. Modifications were made in hull form and the machinery is high pressure single reduction geared turbines with water-tube boilers. The arrangements are modified and the design and decoration, particularly of the public spaces, are quite different.



Name—BORINQUEN
Owner—New York & Porto Rico S.S. Co.
Builder—Bethlehem S.B. Corp., Fore River
Naval Architect—Theodore E. Ferris
Launched—Sept. 24, '30; completed, Feb. 20, '31
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 429 feet; length between perpendiculars, 414 feet; breadth molded, 59 feet 6 inches; depth molded, to hurricane deck at side, 35 feet; draft, designed, 23 feet 6 inches; displacement loaded, 10,450 tons; gross tonnage, 7114; net tonnage, 4249; passenger capacity, first, 261; second, 96; cargo capacity, 240,170 cubic feet, distributed as follows: Refrigerated, 136,100; special cold storage, 6370; general, 97,700. Speed, 17½ knots; service, 16 knots.

MACHINERY PARTICULARS

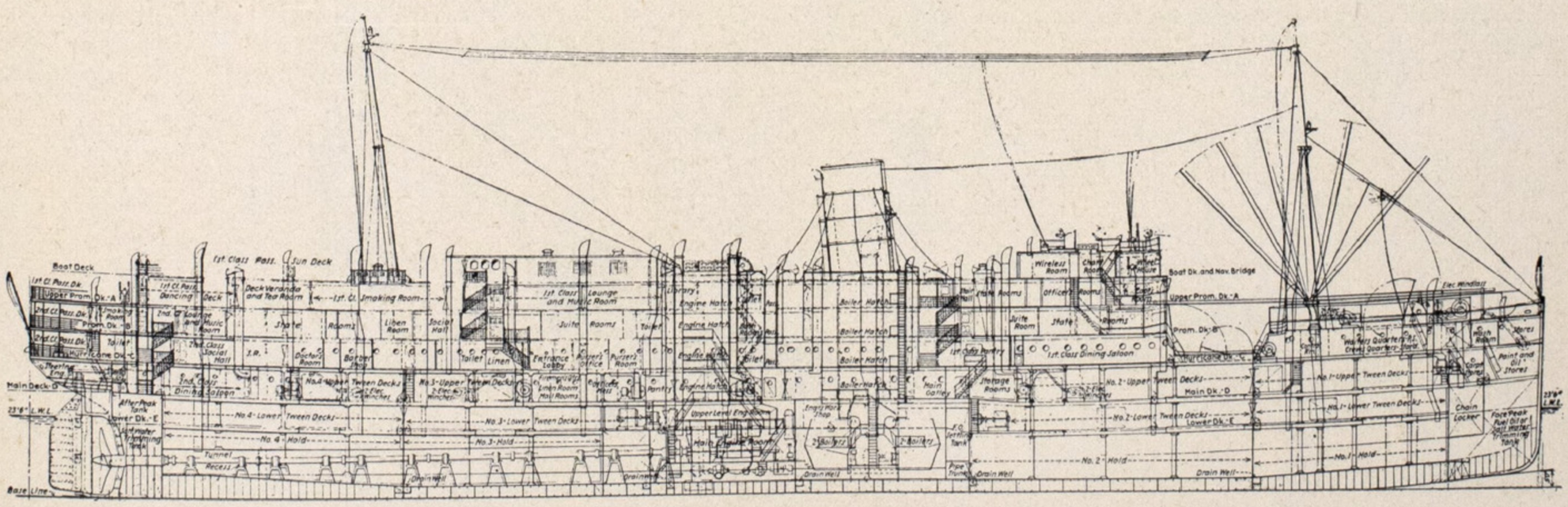
Main Engine—One, reaction type turbine with single reduction Falk gears; three ahead and two astern turbines, built by Bethlehem Shipbuilding Corp. Fore River plant. Size, 6500 horsepower at 92 revolutions per minute.

Boilers—Four, Babcock & Wilcox watertube marine boilers with total heating surface of 17,844 square feet and total superheating surface of 1560 square feet; working pressure, 400 pounds; total steam temperature 600 degrees Fahr.; fuel, oil. Superheaters, oil burning equipment and other boiler room accessories, Babcock & Wilcox.

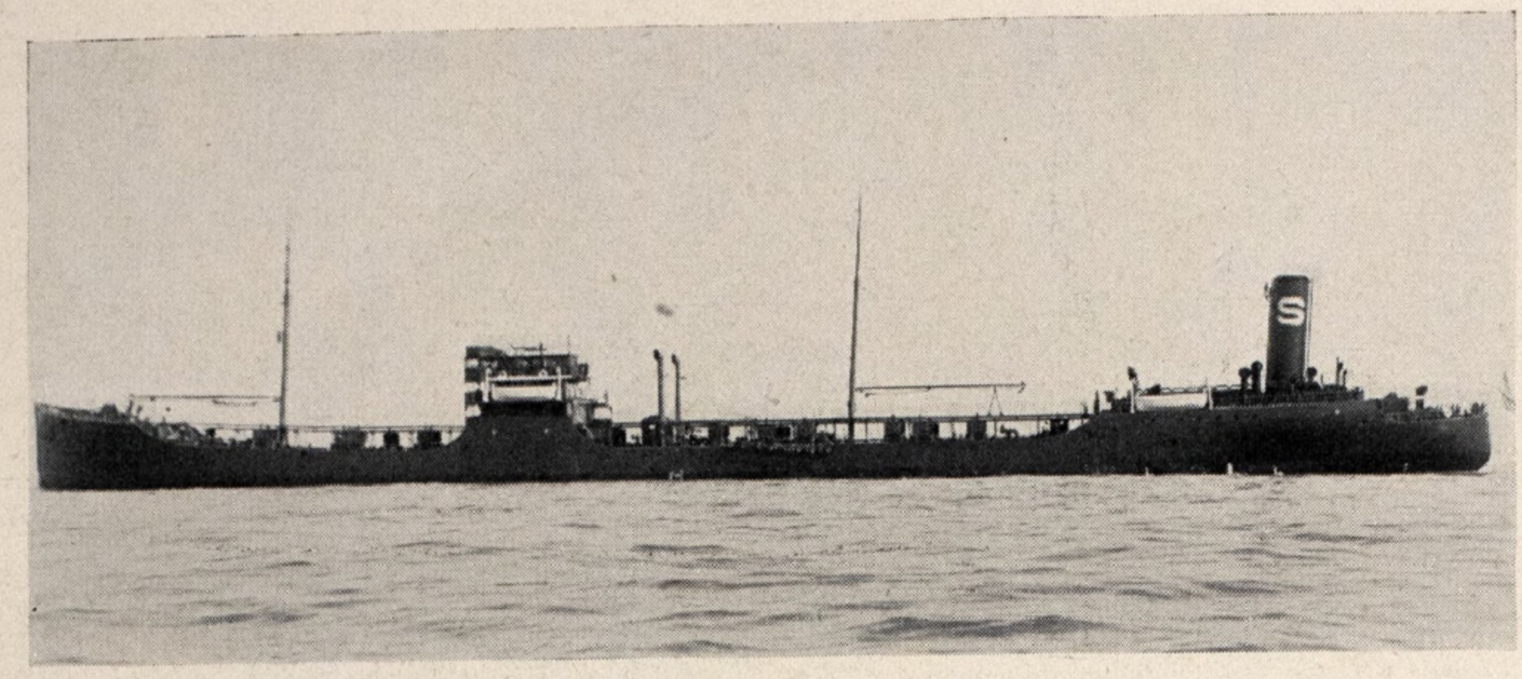
Generating Sets—Three, 250 kilowatts, 240 volts, geared turbine generating sets, 6600/120 revolutions per minute, 350 pounds steam pressure, 600 degrees total temperature at 28-inch vacuum, supplied by Westinghouse Electric & Mfg. Co.

AUXILIARY EQUIPMENT

Pumps—Worthington (major); Northern
Main & Aux. Air Ejectors—Westinghouse
Windlass—Hyde Windlass Co.
Winches—(electric) Lidgerwood
Steering Engine (hy. elec.)—Hyde, Waterbury
Propellers—Designed by Beth. S.B. Corp. cast by American Manganese Bronze Co.
Refrigeration—Brunswick-Kroeschell Co.
Marine Hardware—H. S. Getty & Co., Inc.
Gyro Compass—Searchlight—Sperry
Fuel Oil Heaters—Alco Products Inc.
Feed Water Heaters—Alco Products Inc.
Anchors—Baldt Anchor, Chain & Forge Corp.
Blowers (Two)—B. F. Sturtevant Co.
Electrical Controls—Cutler-Hammer, Inc.
Evap. & Distiller—Davis Engineering Corp.
Soot Blowers—Diamond Power Specialty
Electric Batteries—Electric Storage Battery Co
Refrigerators (individual)—General Electric
Windows—Kearfott Engineering Co.
Turbine Pump Drives—Kearfott
Radio Equipment—Radiomarine Corp.
Oil Purifiers—Sharples Specialty Co.
Lighting Fixtures—Sterling Bronze Co.
Galley Equip. (electric)—Westinghouse
Electric Motors & Controls—Westinghouse



BRILLIANT—Tanker—Ocean—Single Screw—Diesel



Name—Brilliant
Owner—Standard Transportation Co.
Builder—Sun Shipbuilding & Dry Dock Co.
Naval Architect—John W. Hudson
Launched—Nov. 5, '30; comp. Nov. 17, '30
Classification—American Bureau & Lloyds

HULL PARTICULARS

Length over all, 497 feet 10 inches; length between perpendiculars, 480 feet 6 inches; breadth molded, 65 feet 9 inches; depth molded, 37 feet; draft, 27 feet 2 inches; displacement loaded, 19,160 tons; gross tonnage, 9078; net tonnage, 5528; deadweight, 13,430 tons; fuel capacity in barrels of oil, 11,632; fuel consumption per day, 12.3 tons; radius without refueling, 28,800 nautical miles; speed, 11 knots.

MACHINERY PARTICULARS

Main Engine—One, Sun-Doxford opposed piston oil engine built by Sun Shipbuilding & Dry Dock Co. This engine is of 4-cylinder 2-cycle type with attached scavenging pump. The cylinder diameter is 23⅝ inches and the combined stroke is 91.32 inches. The brake horsepower at the shaft is 2800 at 80 revolutions per minute.

Boiler—One, marine water tube type built by the Foster Wheeler Corp. Size, 4000 square feet of heating surface; fitted for burning oil.

Auxiliary Generators—Two, 4-cylinder 120 horsepower Cooper Bessemer diesel engines each direct connected to a 75 k.w. General Electric generator, operating at 325 revolutions per minute.

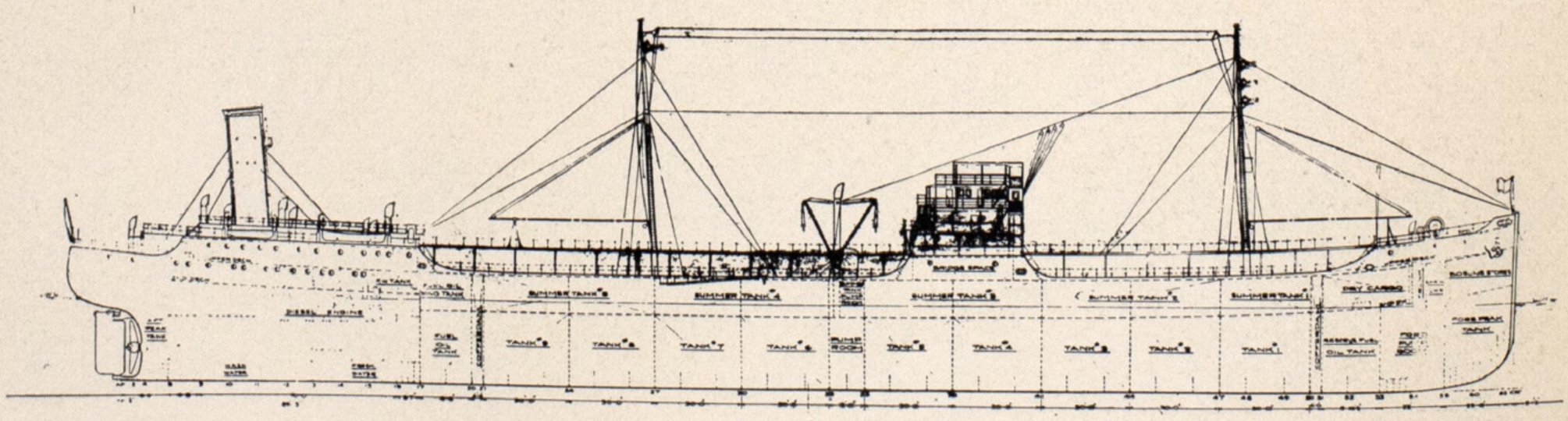
DESCRIPTION

Two deck type with straight stem and cruiser stern, built on the longitudinal bracketless system. There are nine main cargo tanks and shelter deck, poop, bridge and forecastle decks of steel. Machinery, one opposed piston type diesel engine located in the stern.

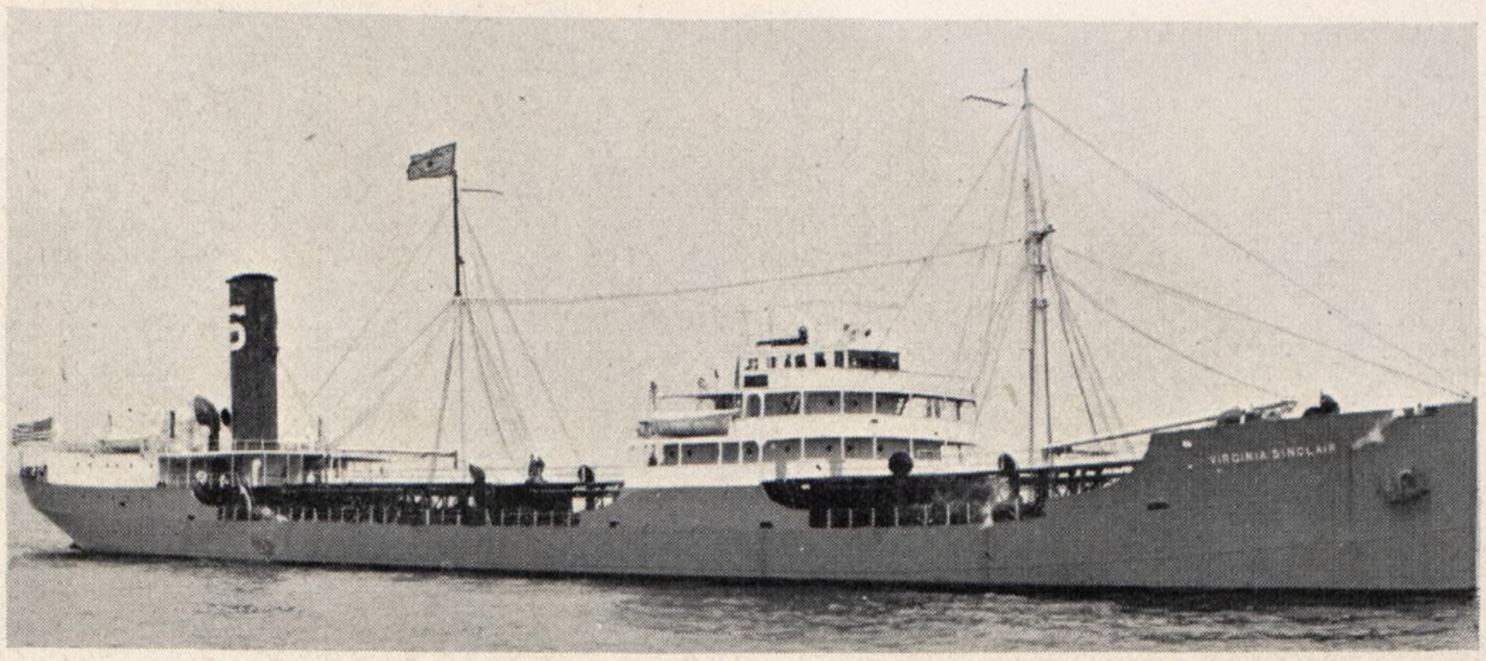
AUXILIARY EQUIPMENT

Pumps—Dean; Morris; Worthington
Windlass—American Engineering Co.
Winches—American Engineering Co.
Steering Engine—American Engineering Co.
Propellers—Sun Shipbuilding & Dry Dock Co.
Gyro Compass-Gyro Pilot—Sperry
Searchlights-Rudder Ind.—Sperry
Refrigeration—Brunswick-Kroeschell
Anchors—Baldt Anchor, Chain & Forge Corp.
Electric Motors—Diehl Mfg. Co.
Anchor Chain—National Malleable
Telegraphs—Chas. Cory Corp.
Clocks—Chelsea Clock Co.
Evaporator—Davis Engineering Corp.
Feed Water Heater—Davis
Distiller-Coolers—Davis Engineering Corp.
Waste Heat Boilers—Foster Wheeler
Soot Blowers—Diamond Power Specialty
Radio Equipment—Radiomarine Corp.
Oil Purifiers—Sharples Specialty Co.
Marine Hardware—H. S. Getty & Co.
Shaft Sleeves—Shenango-Penn Mold Co.
Floor Plates—Alan Wood Steel Co.

This vessel, as so many recent tankers, is built on the Isherwood bracketless system of longitudinal ship construction. Protection of the vessel at inaccessible and exposed parts is provided for by the careful use of bituminous solution and bituminous enamel supplied by the W. A. Briggs Bitumen Co.



VIRGINIA SINCLAIR—Tanker—Ocean—Single Screw—Turbine



DESCRIPTION

This tanker and sister ship HARRY F. SINCLAIR, JR. are geared turbine driven. The hull is built on the bracketless system of construction throughout length of tanks with ordinary transverse framing at ends. There are two continuous longitudinal bulkheads in place of the usual centerline bulkhead and wing summer tanks.

Name—VIRGINIA SINCLAIR
Owner—Sinclair Navigation Co.
Builder—Bethlehem S.B. Corp., Fore River
Naval Architect—Owner & Beth. S.B. Corp.
Launched—Oct. 9, '30; completed, Dec. 20, '30
Sister Ship—HARRY F. SINCLAIR, JR. respectively launched and completed, Nov. 24, '30; Feb. 28, 1931
Classification—American Bureau & Lloyds

HULL PARTICULARS

Length over all, 435 feet ¾ inch; length between perpendiculars, 416 feet; breadth molded, 57 feet; depth molded, 32 feet; draft, summer load line, 25 feet 6¾ inches; displacement loaded, 13,340 tons; gross tonnage, 6151; net tonnage, 3796; total deadweight, 9345 tons; cargo capacity, liquid, cubic feet, 381,100; bunker fuel capacity of oil in tons, 1060; speed, 13 knots.

MACHINERY PARTICULARS

Main Engine—One, two-cylinder double reduction geared turbine, built by De Laval Steam Turbine Co. Size, 4000 horsepower at 75 revolutions per minute.

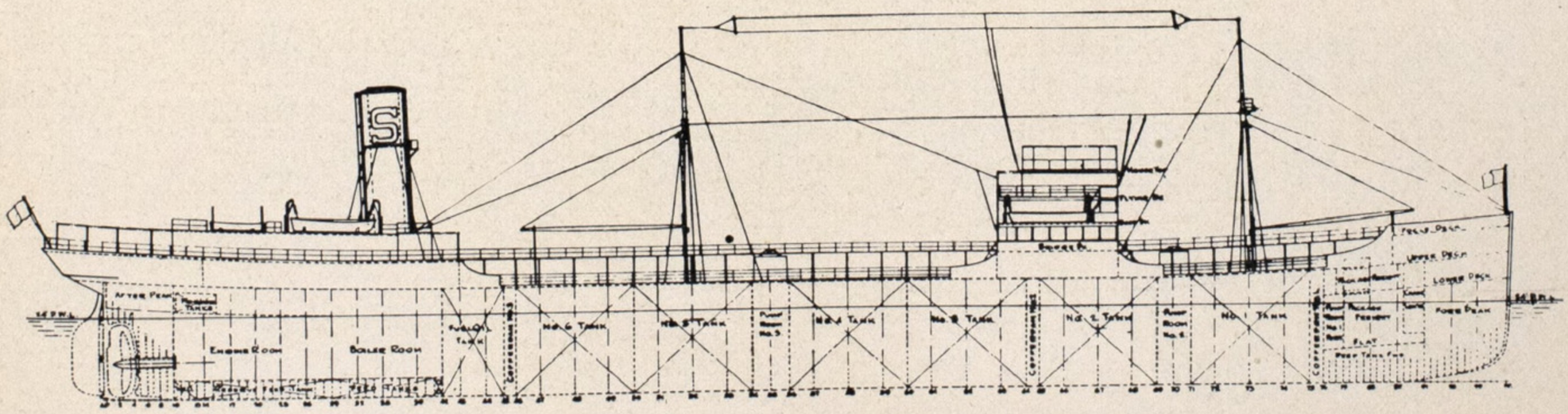
Boilers—Three, Babcock & Wilcox watertube marine boilers, total heating surface, 10,116 square feet, total superheating surface, 1113 square feet and total air heating surface, 5199 square feet; working pressure, 400 pounds; superheat 200 degrees Fahr.; fuel, oil. Superheaters, oil burning equipment, air heaters and other boiler room accessories, supplied by Babcock & Wilcox Co.

AUXILIARY EQUIPMENT

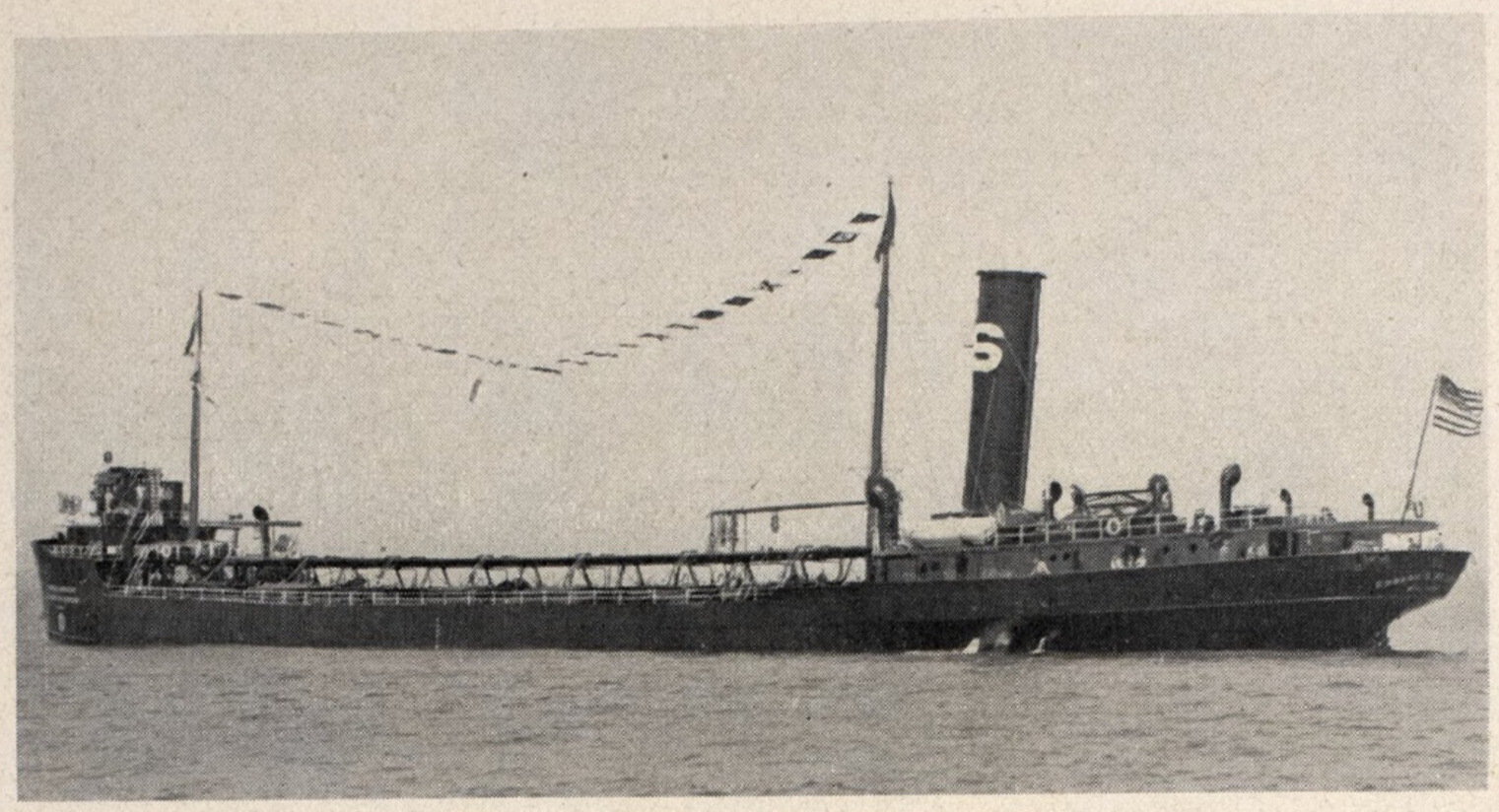
Pumps—Warren (major share); Worthington; Northern
Main & Aux. Air Ejectors—Foster-Wheeler
Windlass—Winches—Hyde Windlass Co.
Steering Engine—Hyde Windlass Co.
Propellers—Cramps Brass & Iron Fdry.
Refrigeration—Brunswick-Kroeschell Co.
Electric Generators — De Laval — Crocker Wheeler
Pump Motors—Fans—Westinghouse
Auxiliary Lighting (electrical end)—Diehl
Blower & Fan Motors—Diehl
Gyro Compass & Pilot—Sperry Gyroscope
Anchors—Baldt Anchor, Chain & Forge Corp.
Anchor Chain—National Malleable
Clock Equipment—Chelsea Clock Co.
Evap. & Distiller—Davis Engineering Corp.
Oil Purifiers—De Laval Separator Co.
Soot Blowers—Diamond Power Specialty
Radio Equipment—Radiomarine Corp.
Deck Covering—Selby, Battersby & Co.
Submarine Signal—Submarine Signal Co.
Air Compressor—Westinghouse Air Brake Co.
Floor Plates—Alan Wood Steel Co.

The VIRGINIA SINCLAIR and sister ship HARRY F. SINCLAIR JR. are built on the Isherwood bracketless system except at ends which is transverse framing. The Butterworth tank cleaning system has been installed.

With such high steam pressure (400 pounds) and with superheat and careful steam conditions in every respect, these tankers are expected to give an unusually high economy in operation. Great care was also exercised in determining the most efficient form of hull and the lines are based on previous model tests of ships of the same type. During official trial over a measured mile the new tanker logged 13.305 knots at 73.8 revolutions per minute corresponding to 3968 shaft horsepower and 24 feet 1 inch draft. A full power, 6-hour economy run, gave a result of .668 pound of oil per shaft horsepower per hour for all purposes.



EDWARD G. SEUBERT—Tanker—Great Lakes—Single Screw—Steam



Name—EDWARD G. SEUBERT
Owner—Standard Oil Co. of Indiana.
Builder—Manitowoc Shipbuilding Corp.
Naval Architect—N. J. Pluymert
Launched—Jul. 2, '30; compl., Sept. 15, '30
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall, 400 feet 7 inches; length between perpendiculars, 390 feet 3 inches; breadth molded, 53 feet 3 inches; depth molded, 27 feet; draft, 19 feet 6 inches; displacement loaded, 9930 short tons in fresh water; gross tonnage, 4432; net tonnage, 2724; cargo capacity, 2,-100,000 United States gallons; bunker fuel capacity 344 short tons of fuel oil; speed in loaded condition, 14 statute miles per hour.

MACHINERY PARTICULARS

Maine Engine—One, 3-cylinder inverted triple expansion steam engine, built by Manitowoc Shipbuilding Corp. Size, 23½ x 38 x 63 inches and 42 inches stroke; indicated horsepower, 2400 at 90 revolutions per minute.

Boilers—Two, scotch type, single ended, built by the Manitowoc Shipbuilding Corp. Size, 15 feet 4½ inches in diameter and 11 feet 6 inches long; working pressure, 180 pounds per square inch; fuel, oil.

DESCRIPTION

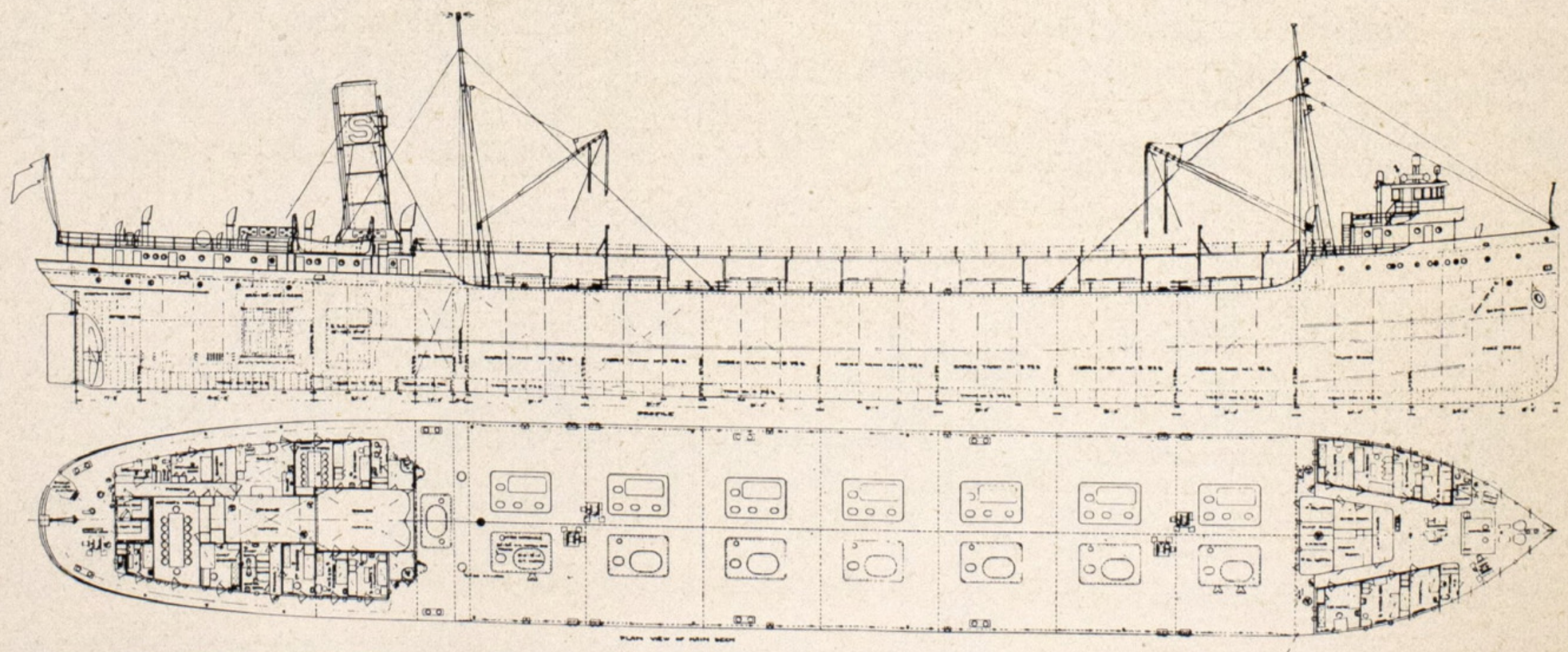
A single deck vessel constructed on the longitudinal system with a straight stem and elliptical stern with a finely modeled hull. In general, similar, but somewhat larger than the ROBERT W. STEWART built for the same owner in 1928. Her cargo capacity is about 100,000 gallons more. The main drive is a reciprocating steam engine of 2500 I.H.P.

Auxiliary Generators—Two Engberg reciprocating engine driven 15 kilowatts each. Built by Troy Engine and Machine Co.

AUXILIARY EQUIPMENT

Manufacturers of:
Pumph—Todd, Morris, Dean, National
Windlass—American Ship Building Co.
Winches—Manitowoc Shipbuilding Co.
Steering Engine—Manitowoc Shipbuilding
Propellers—Manitowoc Shipbuilding Corp.
Refrig.—Brunswick-Kroeschell; Frigidaire
Oil Burning Equipment—Todd
Rudder Indicator—Benson Electric Co.
Electric Whistles—Benson Electric Co.
Telegraph—Chas. Cory Corp.
Radio Direction Finder—Kolster (McKay)
Direction Indicators—Alexander McNab
Anchor Chain—National Malleable Co.
Gyro Compass—Sperry
Shaft Sleeves—Shenango-Penn Mold Co.
Rudder (streamline type)—Oertz

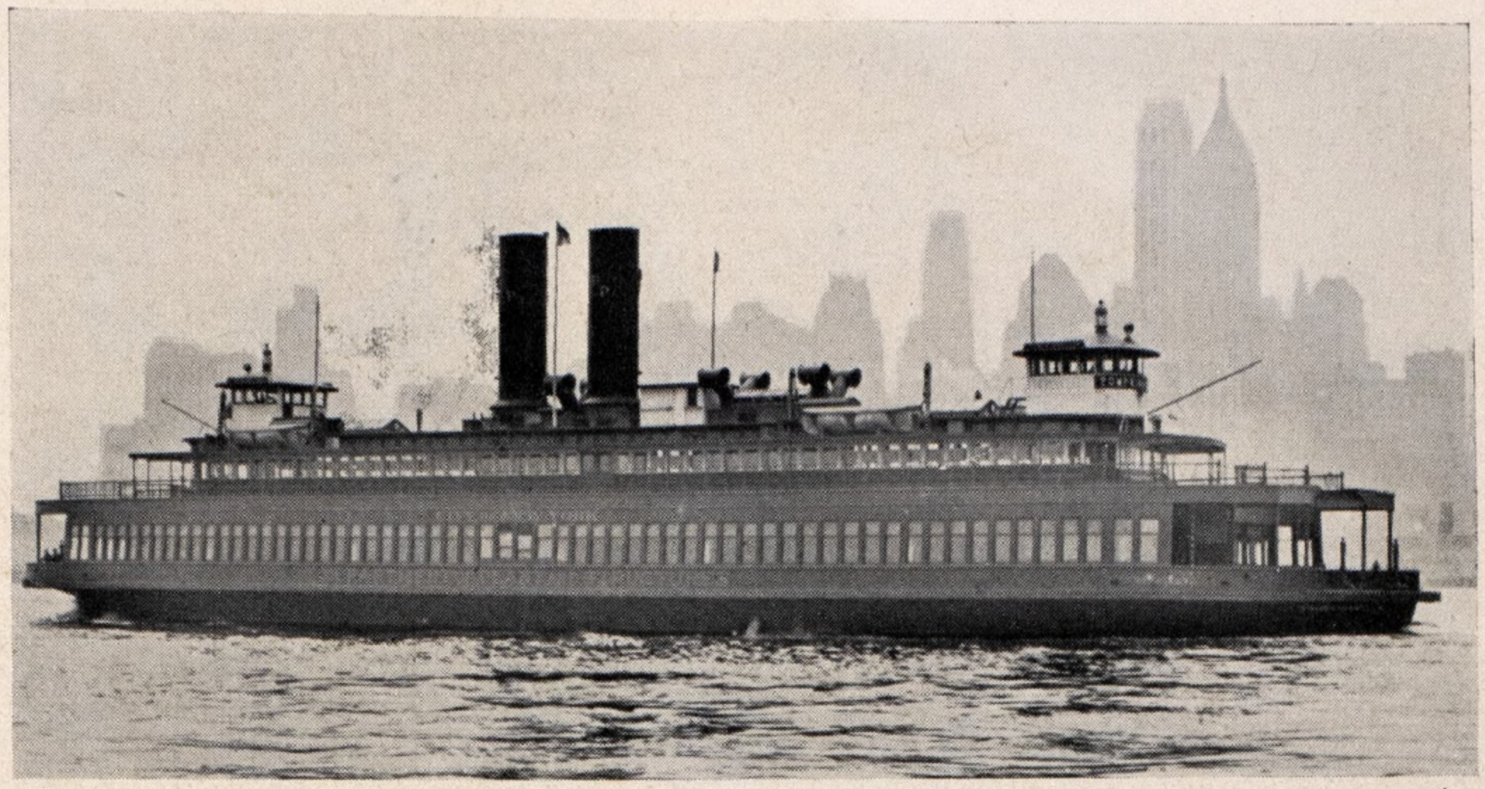
The EDWARD G. SEUBERT is built on the regular Isherwood longitudinal system of construction. The pump room is located forward, aft of which come the seven double main cargo tanks followed by a cofferdam space. Then comes the fireroom with oil burning equipment. A double bottom is fitted throughout the entire length.



TOMPKINSVILLE—Ferry—Double Ended—Single Screw—Steam

DESCRIPTION

This vessel is similar to the DONGAN HILLS built by the same company in 1929. She is now in service between Staten Island and Manhattan. There are two team gangways and two passenger cabins, one on each side of the main deck. Two decks accommodate over 1600 passengers. The gangways provide room for 32 vehicles.



Name—TOMPKINSVILLE
Owner—City of New York
Builder—Staten Island Plant, United D.D. Inc.
Naval Architect—R. W. Morrell
Launched—Sept. 11, '30; comp. Nov. 20, '30
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 267 feet; length between perpendiculars, 254 feet; breadth molded, 47 feet; breadth over guards, 66 feet; depth molded, 19 feet 9 inches; draft loaded, 13 feet 9 inches; displacement light, 1785 tons; gross tonnage, 2045; net tonnage, 1391; passenger capacity, 2300; vehicle capacity, 32; bunker fuel capacity of oil in gallons, 32,000, in short tons, 128; speed, cruising, 12 knots.

MACHINERY PARTICULARS

Main Engine—One, double compound condensing reciprocating steam engine consisting of two units coupled together at the crankshaft. Size, 22½ inches by 50 inches and 30-inch stroke. The crankshaft is 12½ inches in diameter and consists of two solidly forged units coupled in the center. This engine develops about 4185 indicated horsepower at 152 revolutions per minute; built by the Staten Island Plant, United Dry Docks, Inc.

Boilers—Four, Babcock & Wilcox watertube marine boilers with a total heating surface of 14,308 square feet; working pressure, 225 pounds per square inch; fuel, oil.

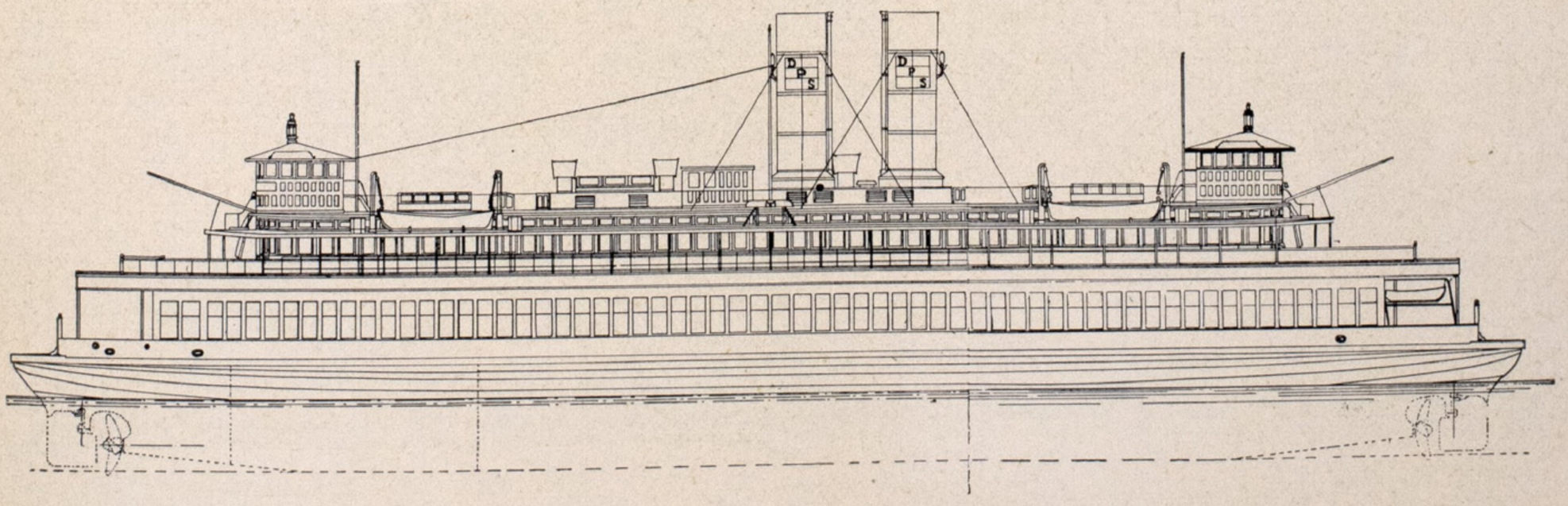
AUXILIARY EQUIPMENT

Manufacturers of:

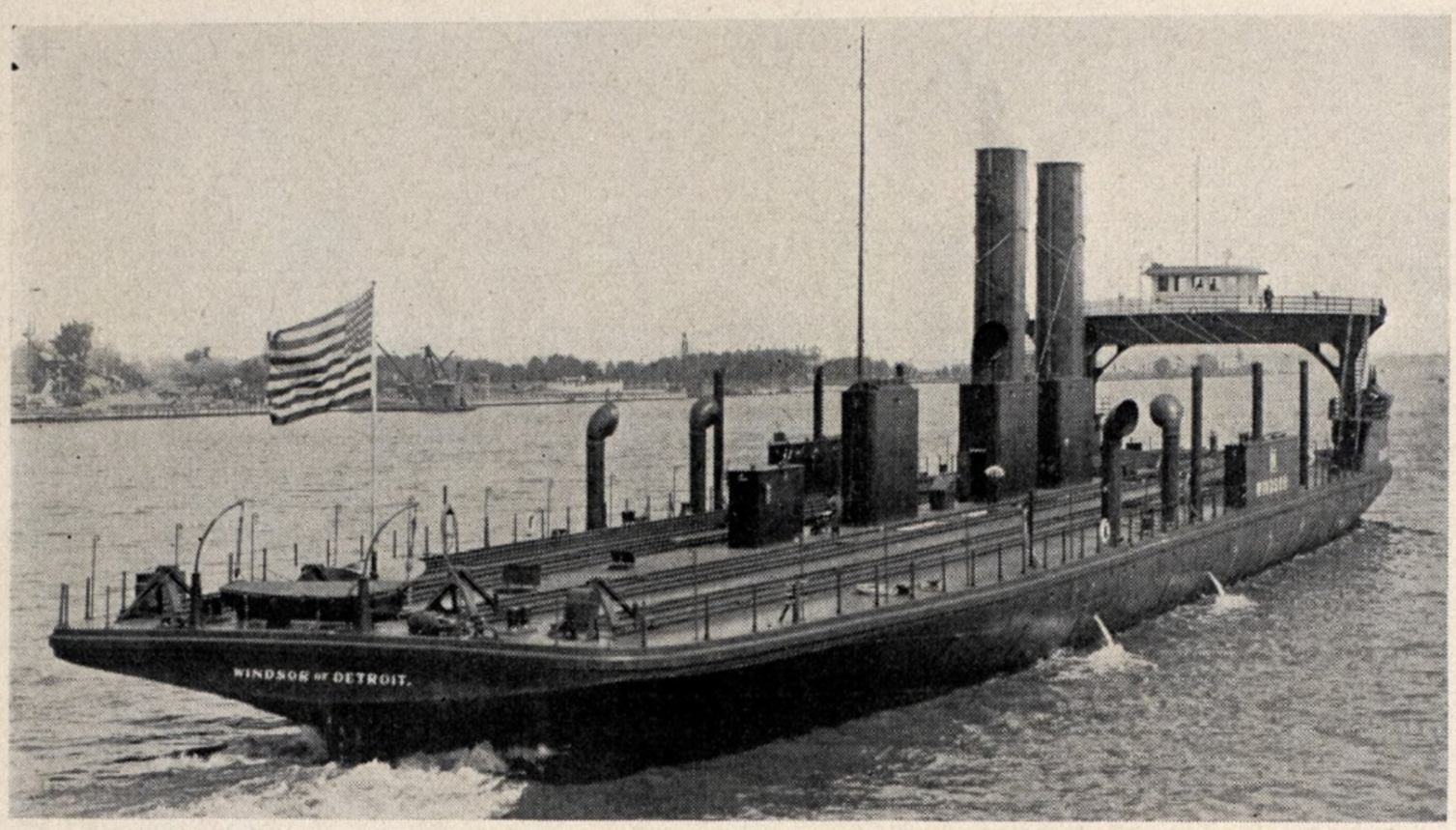
Pumps—Worthington Pump & Mach. Corp.
Steering Engine—Hyde Windlass Co.
Propellers—Federal Steel Foundry
Oil Burning Equipment—Todd
Electric Generators—General Electric Co.
Telegraphs—Chas. Cory Corp.
Feed Water Heater—Davis Engineering Corp.
Stern Bearings—Goodrich (cutless)
Shaft Sleeves—Shenango-Penn Mold Co.
Engine Room Flooring—Alan Wood Steel Co.

The TOMPKINSVILLE is the latest ferryboat for the City of New York and with her sister ferry the DONGAN HILLS, ranks as the largest. This vessel is a double ended steel hull, screw propelled, oil burning passenger and vehicle ferry. Two decks serve for passenger accommodations providing in all seating capacity for 1650 persons.

Metal sheathing provides maximum protection from fire. Maximum requirements of the United States steamboat inspection service are met in lifeboats, life belts and life rafts.



WINDSOR—Carferry—Lakes—Double Ended—Twin Screw—Steam



Name—WINDSOR
Owner—Wabash Railway
Builder—Toledo Shipbuilding Co., Inc.
Naval Architect—Edward Hopkins, Toledo Shipbuilding Co., Inc.
Launched—June 28, '30; completed, Aug. 22.
Classification—Owner's requirements

HULL PARTICULARS

Length over all, 370 feet 3 inches; length between perpendiculars, 346 feet; breadth molded, 65 feet; depth molded, 21 feet 6 inches; draft, 16 feet; displacement loaded 6494 tons; gross tonnage, 3131; net tonnage, 2067; cargo capacity, 31 forty-two foot railroad cars; bunker fuel capacity in tons of coal, 400; speed, 14 statute miles per hour.

MACHINERY PARTICULARS

Maine Engines—Four, vertical inverted three-crank compound reciprocating steam engines built by the Toledo Shipbuilding Co., Inc. Cylinder diameters 24 x 36 x 36 inches; stroke 36 inches. Each engine develops 1300 horsepower at 125 revolutions per minute. Total horsepower 5200. Two of these engines are direct connected to propellers at one end and the other two are direct connected to propellers at the other end.

Boilers—Six, scotch cylindrical type, single ended, 13 feet in diameter by 11 feet 6 inches long, with a working pressure of 160 pounds per square inch. Howden forced draft is used; fuel, coal. There are two 52-inch Morison furnaces in each boiler. The grates are 5 feet 6 inches long. Heating surface for six boilers is 13,542 square feet. Total grate surface is 286 square feet. The ratio of heating surface to grate surface is 47.3 to 1. Draft area through tubes for the six boilers is 73.8 square feet.

Auxiliary Generators—Two 15 k.w. Engberg generators 125 volts, 400 revolutions per minute built by Troy Engine & Machine Co.

AUXILIARY EQUIPMENT

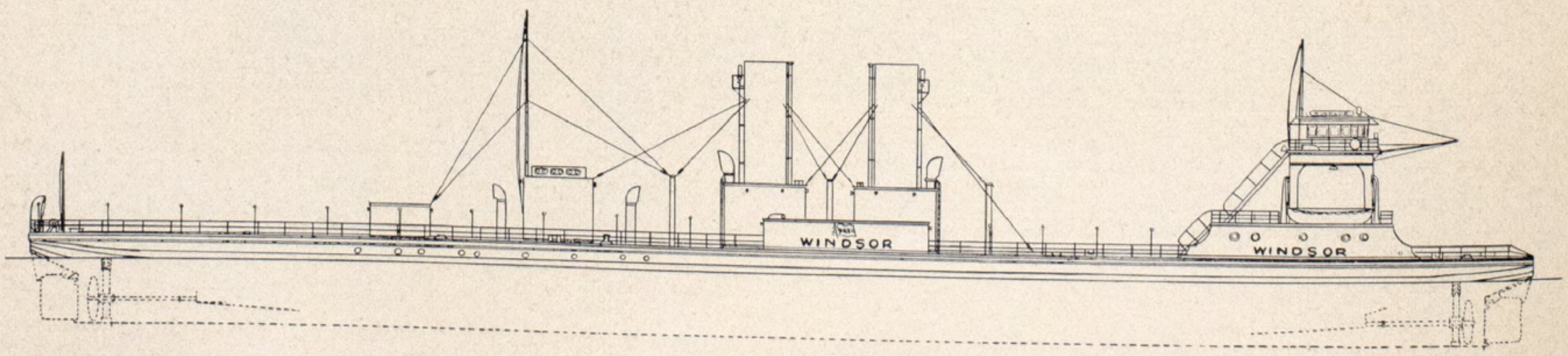
Pumps—Dean and Morris
Condenser—Jet Type—Union Steam Pump Co.
Gypsies—Four, Hyde Windlass Co.
Steering Gear—Steam, Hvde Windlass Co.
Feed Water Heater—Reilly, Griscom-Russell
Thrust Bearings—Kingsbury Machine Works
Air Compressor—Westinghouse Air Brake Co.
Fans—American Blower Co.

One of the qualifications of the WINDSOR as a car transfer vessel is her special fitness for ice breaking. This has been borne in mind in her design and construction. Double ended, with twin propellers at either end, the four engines give the boat a speed of over 14 statute miles per hour. The engine room is well laid out and gives the impression of good order, substantial and reliable machinery. The usual list of auxiliaries have been fitted.

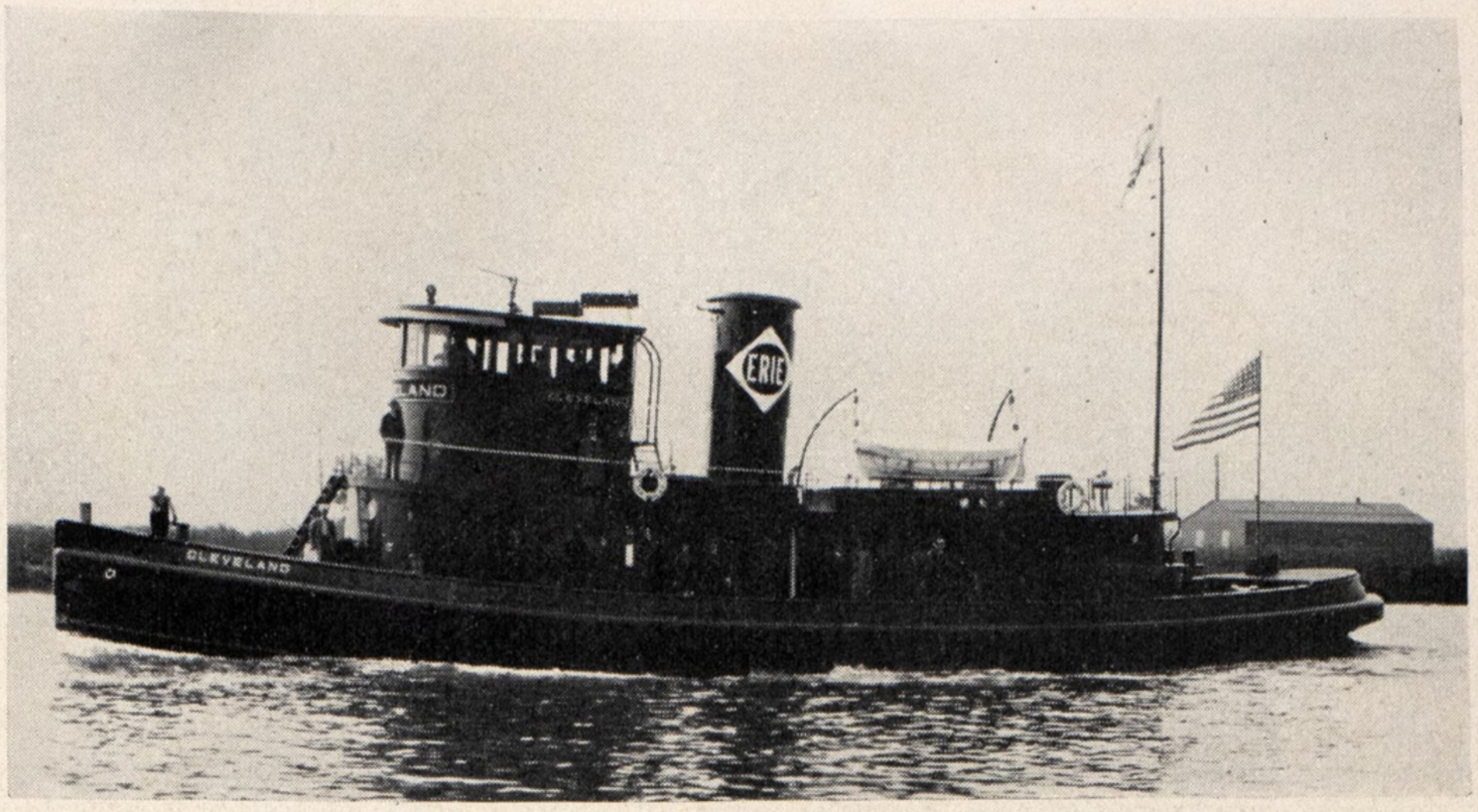
The pilot house at the forward end is supported by a bridge. Under this bridge and on deck are four sets of track accommodating 31 forty-two foot railroad cars.

DESCRIPTION

The WINDSOR is a double ended steel carferry. There are four propellers, two at each end driven by four separate three-cylinder compound engines, steam for which is supplied by six single ended scotch marine boilers. The deck houses are used as shelters only as there is an eight hour shift of crews.



CLEVELAND AND CLASS—Tug—Single Screw—Diesel Electric



DESCRIPTION

This tug and her three sister vessels have been appropriately dubbed "locomotives of the sea." Modern in every respect, power is developed by two diesel engine generating sets. Current so made is supplied to one double armature motor of 800 horsepower directly connected to the propeller.

Name—CLEVELAND
Owner—Erie Railroad Co.
Builder—Pusey & Jones Corp.
Naval Architect—J. W. Millard & Bro.
Launched—July 24, '30; completed Oct. 23.
Sister Ships—ROCHESTER, OLEAN and SCRANTON, respectively, launched July 30, '30, Oct. 4, '30, and Oct. 8, '30: Completed Nov. 12, '30, Dec. 11, '30, and Dec. 29, '30.

HULL PARTICULARS

Length over all, 108 feet; length between perpendiculars, 96 feet; breadth molded, 26 feet; depth molded, 13 feet 9 inches; draft, aft, 12 feet 6½ inches; displacement loaded, 410 tons (fresh water); gross tonnage, 235; net tonnage, 159; bunker fuel oil capacity, 9915 gallons; speed, 14 miles per hour.

MACHINERY PARTICULARS

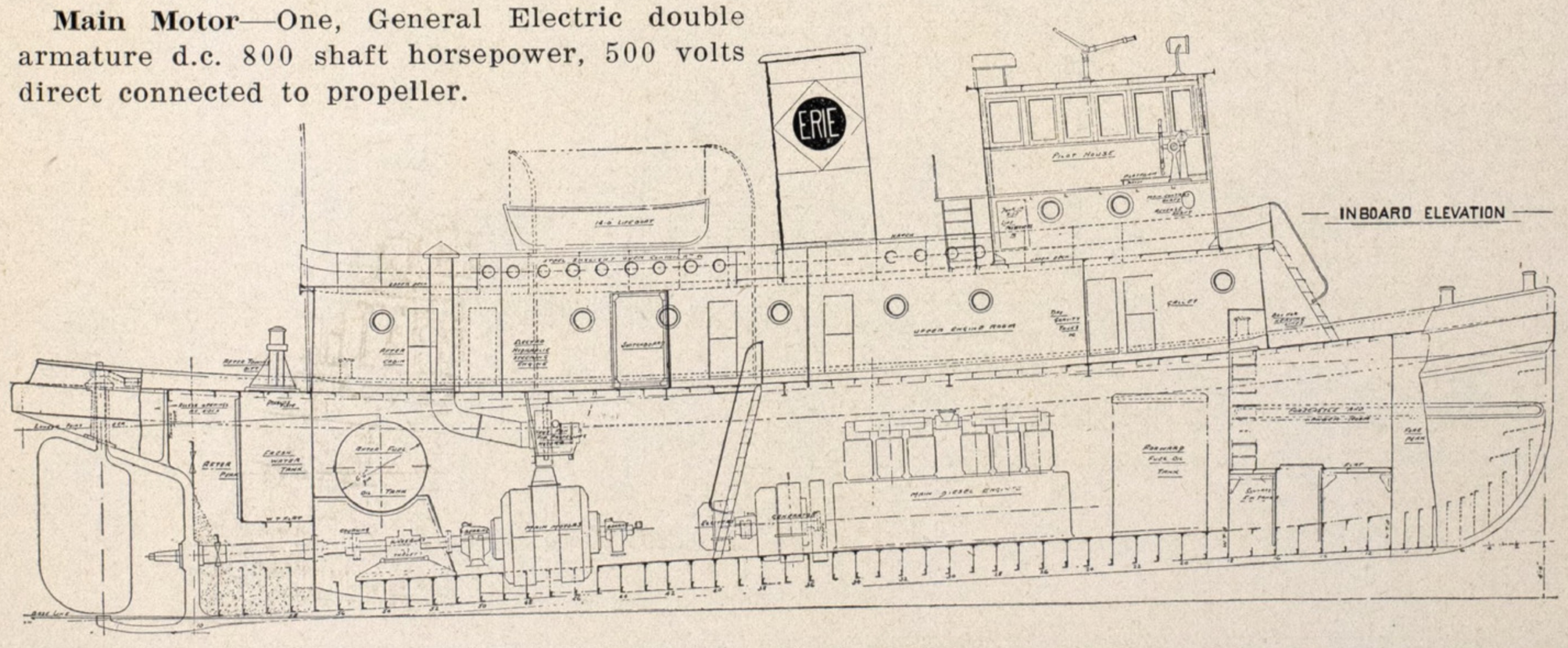
Main Engines—Two, Ingersoll-Rand four-cycle solid injection oil engines. Size, each engine 15 x 20 inches six cylinders, 500 brake horsepower at 270 revolutions per minute.

Main Generators—Two, General Electric d.c. each 330 k.w. 250 volts and each with 30 k.w. 120 volts exciter.

Main Motor—One, General Electric double armature d.c. 800 shaft horsepower, 500 volts direct connected to propeller.

Pumps—Worthington, Cameron
Electric Motors—Diehl Mfg. Co.
Steering Engine—American Engineering Co.
Propellers—Pusey & Jones Corp.
Generator—Four k.w. Hill, General Electric
Anchors—Baldt Anchor, Chain & Forge Co.
Telegraphs—Chas. Cory & Son
Marine Hardware—The Dayton Mfg. Co.
Air Compressors—Ingersoll-Rand Co.
Valves and Fittings—Lunkenheimer, Crane
Stern Bearing—Goodrich (cutless)
Searchlights—Portable Light Co. Inc.
Deck Covering—Selby, Battersby & Co.
Thrust Bearings—Kingsbury Machine Works
Life Boats—Thomas Drein & Son Co.
Binnacles and Compasses—T. S. & J. D. Negus

One of the features of these powerful tugs is the fire-fighting equipment consisting of one Cameron three-stage fire pump with a capacity of 500 gallons per minute. This pump is driven by a 75-horsepower General Electric motor operating at 1700 revolutions per minute. Discharge is to monitor nozzles on top of the pilot house and on the sides of the deck house.



T. L. DUROCHER—Ice Breaking Tug—Lakes—Single Screw—Steam

Name—T. L. DUROCHER
Owner—T. L. Durocher Co.
Builder—American Ship Building Co.
Naval Architect—John A. Smith
Launched—Sept. 22, '30; comp. Oct. 29, '30
Classification—Owner's requirements

HULL PARTICULARS

Length over all, 125 feet; length between perpendiculars, 113 feet 2 inches; breadth molded, 28 feet; depth molded, 16 feet 6 inches; draft, 12 feet 6 inches; displacement loaded, in short tons, 680; gross tonnage, 319; net tonnage, 149; bunker fuel capacity of coal, in tons, 100; speed, 14 statute miles per hour.

MACHINERY PARTICULARS

Main Engine—One, 3-cylinder, vertical, triple expansion reciprocating engine built by Filler & Stowell Co.; size, 17 x 25 x 43 inches x 30 inches stroke; indicated horsepower, 850 at 90 revolutions per minute and 1130 at 125 revolutions per minute.

Boiler—One, scotch marine type, built by Union Iron Works. Size, 15 feet diameter x 11 feet 9 inches long; working pressure 215 pounds per square inch. Fuel, crushed coal on Hoffman stokers with forced draft.

Auxiliary Generators—One Engberg reciprocating engine driven 7½ kilowatts made by Troy Engine and Machine Co. One 4-kilowatt turbine driven set, built by Moon Mfg. Co.

DESCRIPTION

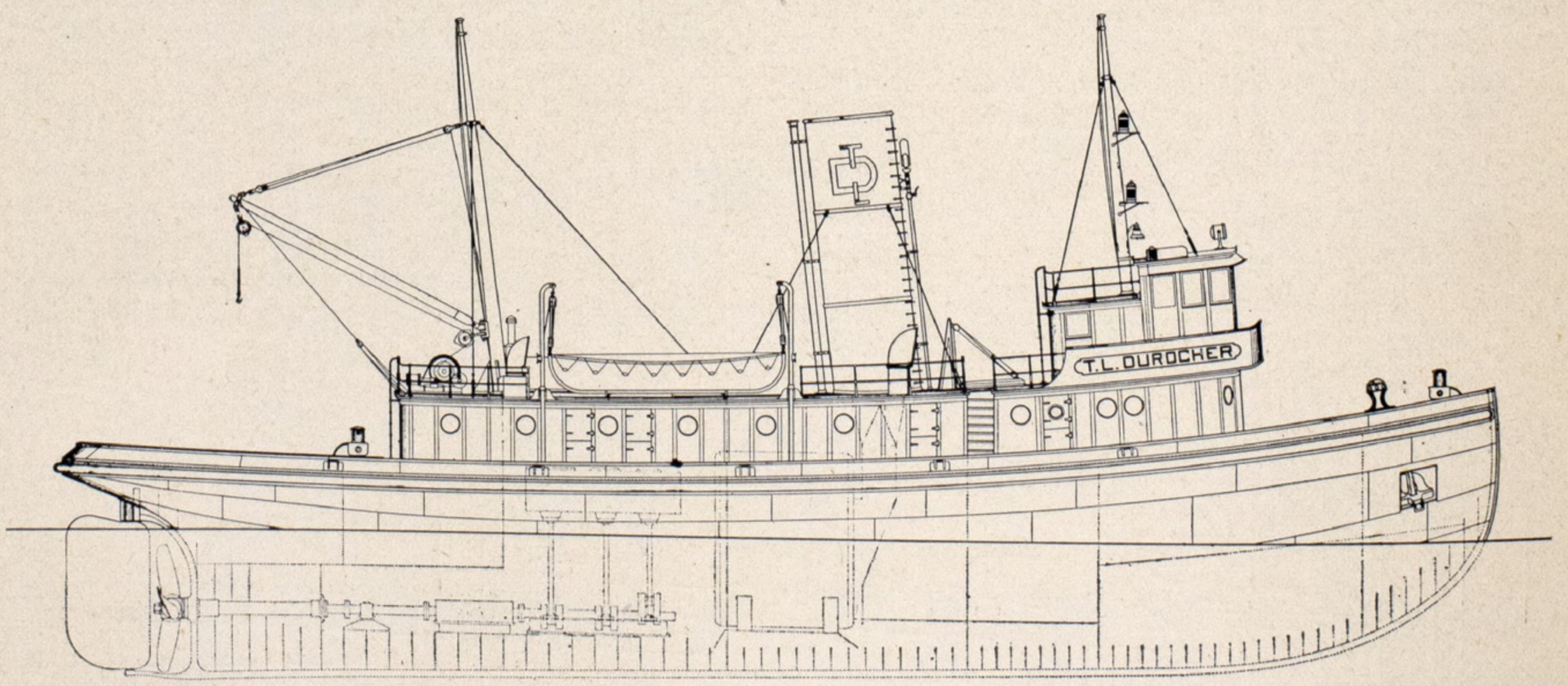
Single screw steel tug for general towing, wrecking and icebreaking on the Great Lakes. Ice to the thickness of three feet, it is estimated, can be broken by this powerful tug. Propulsion is by a reciprocating steam engine of over 1100 horsepower. This vessel can stand severe weather and is fully equipped as a seagoing tug, for service.

AUXILIARY EQUIPMENT

Manufacturers of:
Pumps—Union Steam Pump Co.
Towing Engine—American Engineering Co.
Windlass—The American Ship Building Co.
Winches—Lidgerwood Mfg. Co.
Steering Engine—American Engineering Co.
Propellers—American Ship Building Co.
Anchor Chain—Baldt Anchor, Chain & Forge
Jet Condenser—Union Steam Pump Co.
Distiller (Reilly)—Griscom-Russell
Clocks—Chelsea Clock Co.
Radio Equipment—Radiomarine Corp.

The bow is raked and heavily plated for icebreaking. Though not classified, she is built at least equal to the requirements of either the American Bureau or Lloyd's. The propeller is four-bladed and is 11 feet in diameter and 13 feet in pitch.

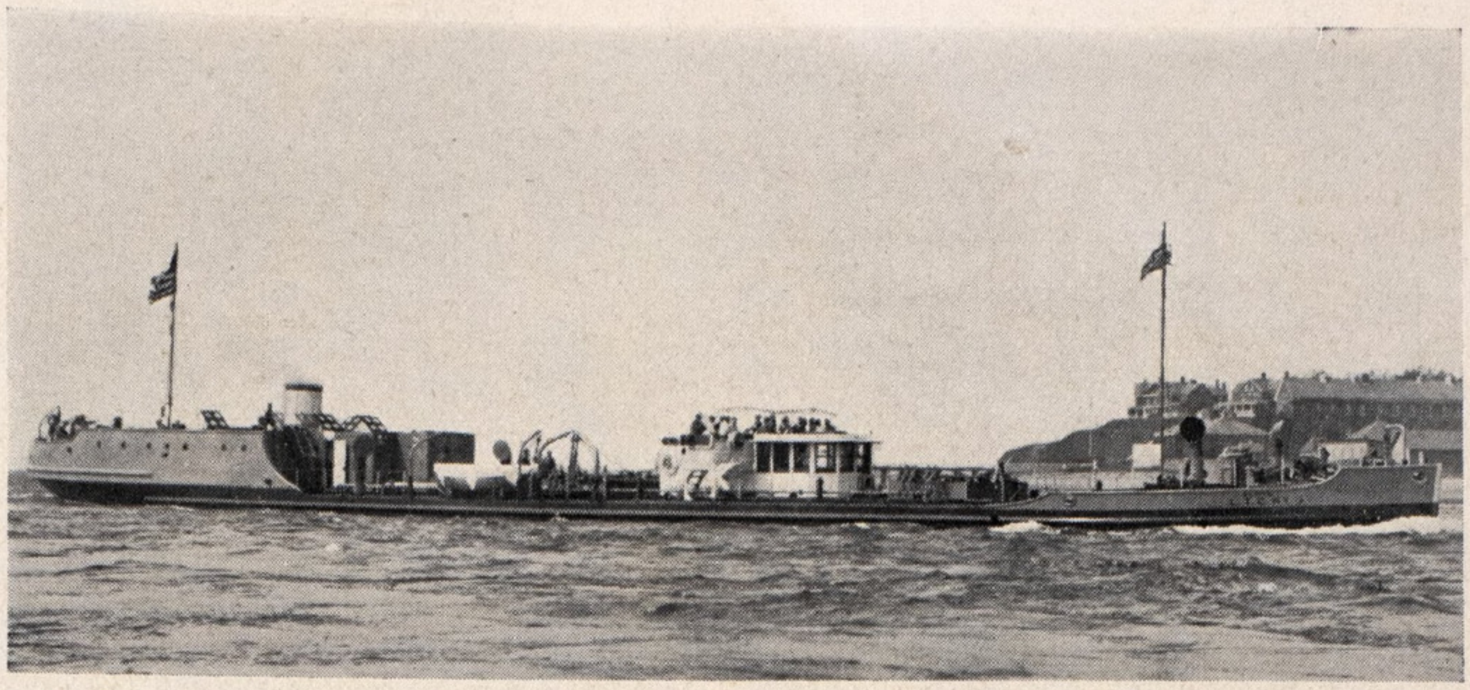
The deck equipment includes a towing machine and one winch serving a 3½-ton, 24-foot boom. Also there is one lifeboat, one life raft and one wooden work boat fitted with a gasoline engine.



L. T. C. NO. 1 & CLASS—Tanker—Canal—Single Screw—Diesel Electric

DESCRIPTIONS

Single screw diesel electric tanker for carrying oil in bulk, for bay, sound and river service, including navigation of the Erie canal with its special requirements of draft and bridge clearance. Equipped with towing machines for handling tow barges when desired. Speed in service 10 knots.



This illustration shows L. T. C. No. 3, a sister ship of L. T. C. No. 1 and No. 2.

Name—L.T.C. No. 1
Owner—Lake Tankers Corp.
Builder—Bethlehem S.B. Corp., Fore River
Naval Architect—Bethlehem Shipbuilding Corp.
Launched—Apr. 29, '30; completed, May 30, '30
Sister Ships—L.T.C. No. 2; L.T.C. No. 3, respectively launched, May 14, '30; June 10, '30; completed, June 13, '30; July 1, '30
Classification—Lloyds Register

HULL PARTICULARS

Length over all, 201 feet 7 inches; length between perpendiculars, 192 feet 6 inches; breadth molded, 32 feet; depth molded, 11 feet 6 inches; draft summer load line, 9 feet 5⅝ inches; displacement loaded, 1311 tons; gross tonnage, 548; net tonnage, 321; cargo capacity, in tons, 720; in cubic feet, 35,540; bunker diesel fuel oil capacity in tons, 25.3; speed, 10 knots.

MACHINERY PARTICULARS

Main Engines—Two, 6-cylinder, 11 x 15 inches Winton diesel engines of 325 horsepower each.

Main Generators—Two, General Electric direct current, each of 210 kilowatts each direct connected to one of the 325 horsepower diesel engines described above.

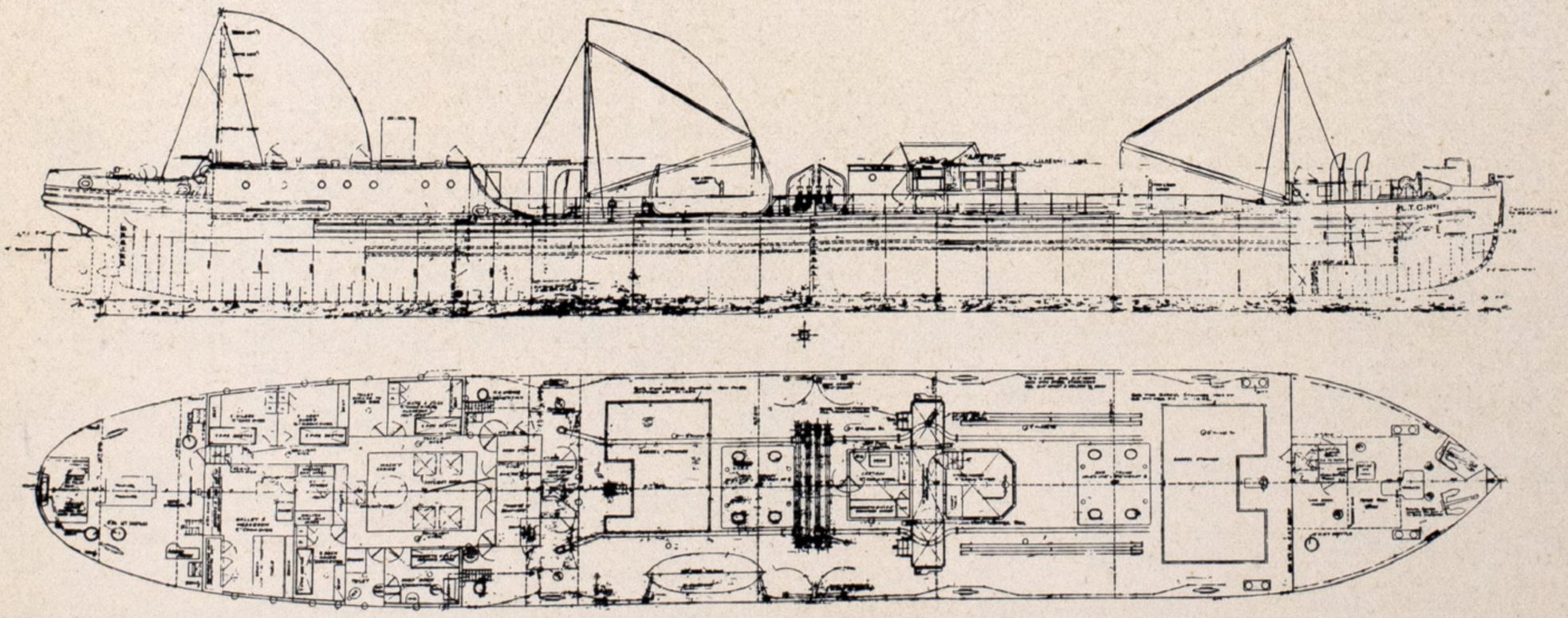
Propelling Motor—One (two 250 horsepower units in tandem) total 500 horsepower built by General Electric.

Auxiliary Generator—One 15 kilowatts General Electric driven by a Winton diesel engine.
Pumps—Northern; Warren
Pump Motors—General Electric
Windlass—Hyde Windlass Co.
Towing Winch—American Engineering Co.
Steering Engine (electric)—Hyde Windlass
Propellers—Roxbury Steel Casting Co.
Oil Purifiers—De Laval Separator Co.
Marine Hardware—H. S. Getty & Co. Inc.
Deck Covering—Selby, Battersby & Co.

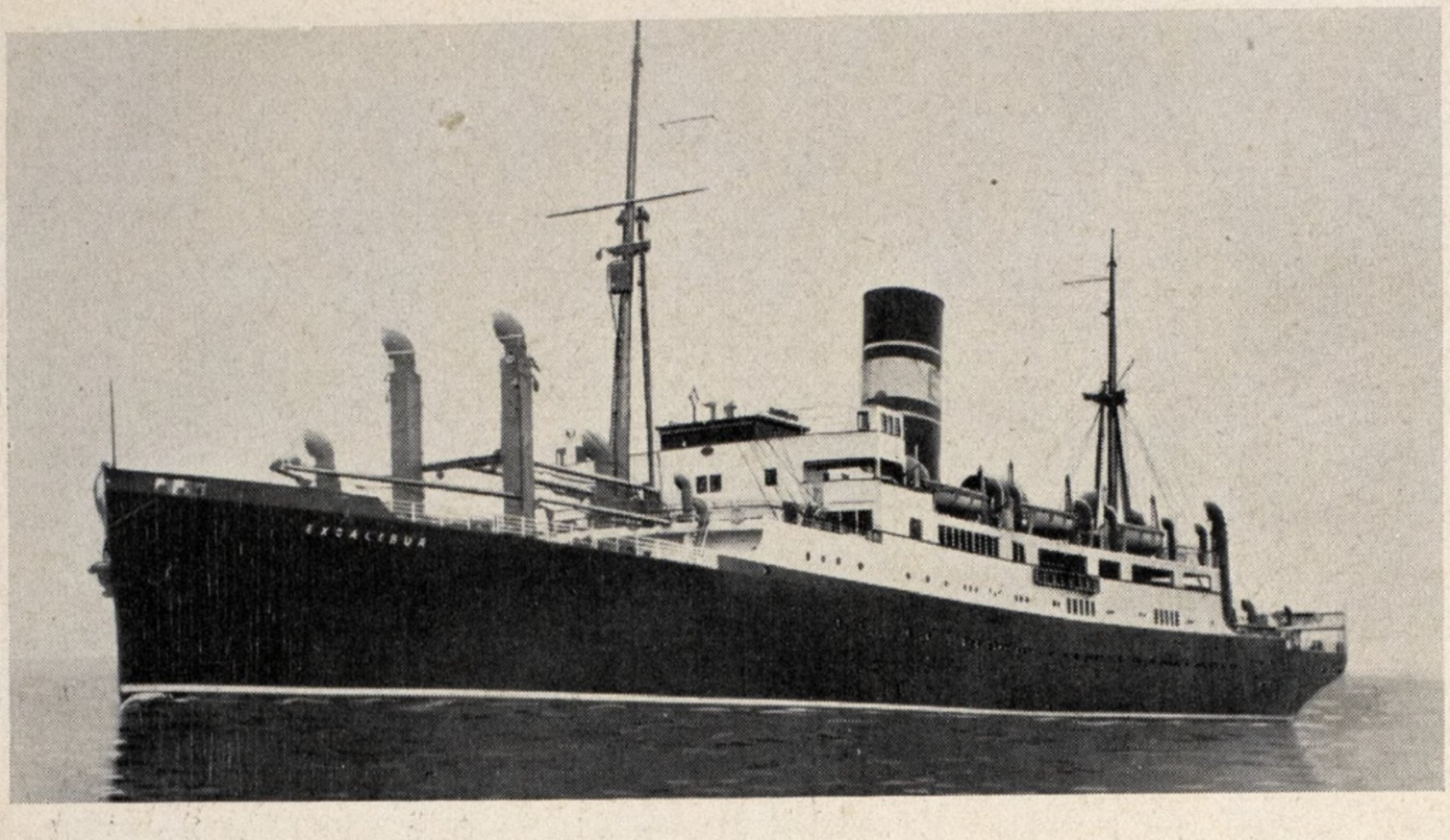
This tanker and her sister vessels the L.T.C. Nos. 2 and 3 are built on the Isherwood bracketless system of construction. Deck room is provided for stowage of cargo in barrels.

These vessels are noteworthy in that they have sufficient ballast capacity to clear the bridges on the New York state barge canal without using cargo tanks for ballast, thus avoiding all chances of contamination of canal water from oily ballast.

The problem of canal operation has been closely studied from practical experience in designing these vessels. The pilot house, the top of which is below the clearance line for canal bridges which is 19 feet 6 inches above the base line of the vessel and 14 feet 7½ inches above the mean draft of the vessel light. Quarters for officers and crew are located on the deck aft above the machinery space.



EXCALIBUR & CLASS—Pass. & Cargo Liner—Single Screw—Turbine



DESCRIPTION

Fast combination freight-passenger and mail steamer with passenger accommodations of distinctly modern design. One sister ship is completed and two more are in process of construction. These vessels are designed for service between New York and principal Mediterranean ports with terminal at Alexandria, Egypt. Single screw turbine reduction gear drive, giving a service sea speed of 16 knots.

Name—EXCALIBUR
Owner—Export Steamship Corp.
Builder—New York Shipbuilding Co.
Naval Architect—George G. Sharp
Launched—Aug. 5, '30; compl., Dec. 15, '30
Sister Ships—EXOCHORDA, EXETER and EXCAMBION. The EXOCHORDA was launched Oct. 18, '30; completed, Feb. '31. The last two will be launched in April 1931 and completed in June and July 1931 respectively.
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 475 feet 4¼ inches; length between perpendiculars, 450 feet; breadth molded, 61 feet 6 inches; depth molded, 42 feet 3 inches; draft, 27 feet $10\frac{15}{16}$ inches; displacement loaded, 15,498; passenger capacity, one class, 152; deadweight capacity, 9298 tons; refrigerated cargo capacity, 31,374 cubic feet; bunker fuel oil capacity in tons, 2019; speed on trial, 18 knots; speed at sea, 16 knots.

MACHINERY PARTICULARS

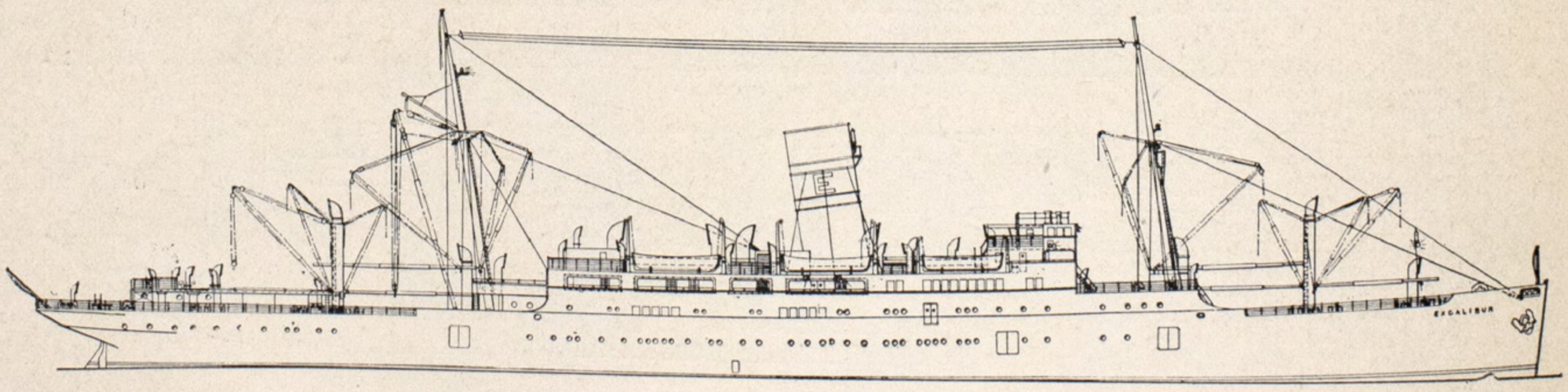
Main Engine—One, triple expansion single reduction gear Parsons turbine built by New York Shipbuilding Co. Gears built by Falk Corp. Horsepower, 8000 at 97 revolutions per minute.

Boilers—Four, Babcock & Wilcox watertube marine boilers with a total heating surface of 16,800 square feet. Total superheating surface of 1600 square feet; working pressure, 375 pounds; superheat, 200 degrees Fahr. Fuel, oil. The oil burning equipment superheaters and other boiler accessories were furnished by Babcock & Wilcox Co.

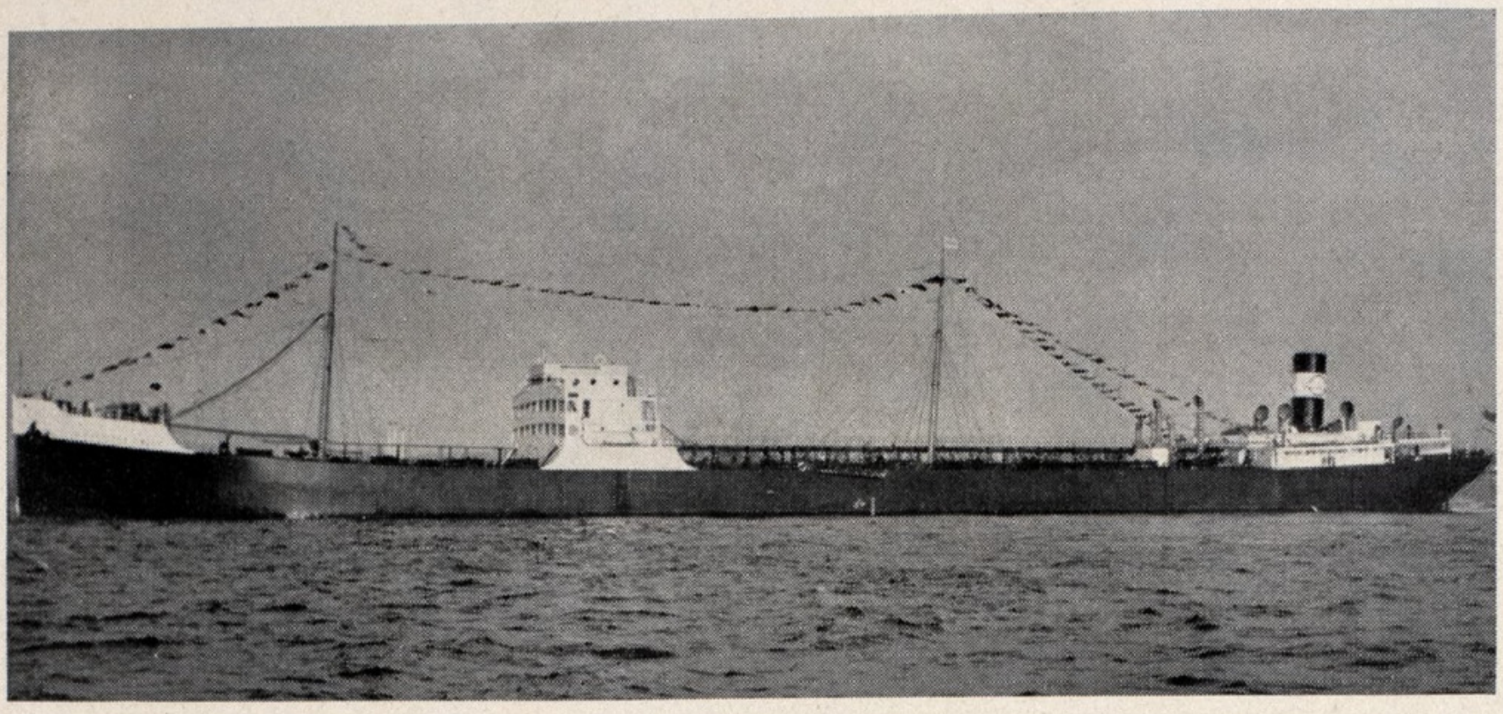
Auxiliary Generators—Three, General Electric, 150 kilowatts 240/120 volts. Two 10 k.w. automatic gasoline engine driven Weir Kilby, Westinghouse generators.

AUXILIARY EQUIPMENT

Pumps—Warren Steam Pump Co.
Windlass, Winches and Steering Engine—Made by Hyde Windlass Co.
Gyro Compass & Pilot—Sperry
Salt & Fresh Water Heaters—Alco Products,
Condenser (aux.)—Worthington
Anchors—Baldt Anchor, Chain & Forge Corp.
Anchor Chain—National Malleable Co.
Refrigeration—Brunswick-Kroeschell
Refrigerator—Frigidaire Corp.
Telegraphs—Chas. Cory Corp.
Clocks—Chelsea Clock Co.
Evaporator, Distiller, Feed Water Heaters, Oil Coolers, Heatr's & Filt'rs—Davis Eng. Corp.
Soot Blowers—Diamond Power Specialty
Reducing Valves—Foster Engineering Co.
Windows—Kearfott Engineering Co.
Valves—Lunkenheimer Co.
Torsionmeters—Alexander McNab
Radio Telegraph—MacKay Radio & Tel. Co.
Direction Finders—Radiomarine Corp.
Injectors—Schutte & Koerting Co.
Deck Covering—Selby, Battersby & Co.
Oil Purifiers—The Sharples Specialty Co.
Marine Hardware—H. S. Getty & Co.
Lighting Fixtures—Sterling Bronze Co.
Air Compressor—Westinghouse Air Brake Co.
Motors and Controls for Pumps, Ventilating Fans & other Under Deck Auxiliaries—Westinghouse



G. HARRISON SMITH—Ocean Tanker—Single Screw—Steam



Name—G. HARRISON SMITH
Owner—Standard Shipping Co.
Builder—Federal Shipbuilding & Dry Dock Co.
Launched—July 12, '30; completed Oct. 3, '30
Classification—American Bureau of Shipping
Sister Ship—W. S. FARISH; launched Oct. 11, '30; completed, Nov. 26, '30

HULL PARTICULARS

Length over all, 544 feet; length between perpendiculars, 525 feet; breadth molded, 74 feet; depth molded, 40 feet 6 inches; draft, 30 feet 7⅝ inches; displacement loaded, 27,240 tons; gross tonnage, 11,752; net tonnage, 7328; cargo capacity, 6,473,000 gallons or 865,400 cubic feet; bunker fuel oil capacity in tons, 2360; speed, 11 knots.

MACHINERY PARTICULARS

Main Engine—One cross compound double reduction geared De Laval steam turbine with high and low pressure stages. Horsepower normal, 4000 at 75 revolutions per minute; maximum, 4400 at 77.5 revolutions per minute. Single screw; machinery located aft.

Boilers—Two, Babcock & Wilcox marine type water tube boilers with a total heating surface of 10,160 square feet; total superheating surface, 1806 square feet; total air heating surface, 6920 square feet; working pressure, 400 pounds per square inch; total steam temperature, 750 degrees Fahr.; fuel, oil. Superheaters, air heaters, feed water regulators and desuperheaters and fire brick for furnaces were supplied by the Babcock & Wilcox Co.

Electric Generators—Two turbine driven generators; De Laval steam turbines and Westinghouse generators.

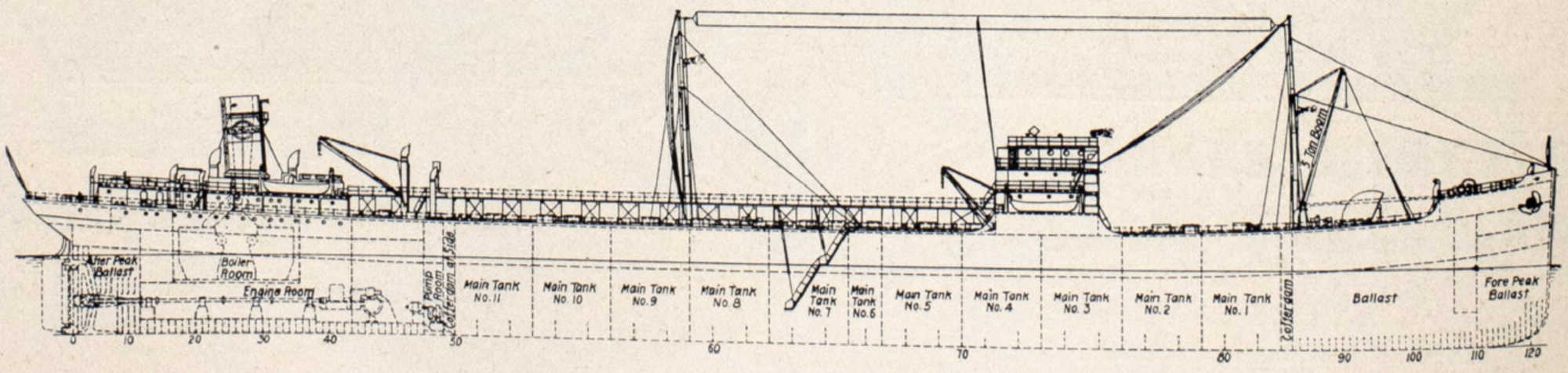
DESCRIPTION

This vessel is an outstanding example of modern marine engineering. A steam pressure of 400 pounds per square inch with superheat to 750 degrees Fahr. is used for a compound steam turbine with double reduction gearing. The steam is supplied by two watertube boilers equipped with economizers and superheaters and fitted to burn fuel oil.

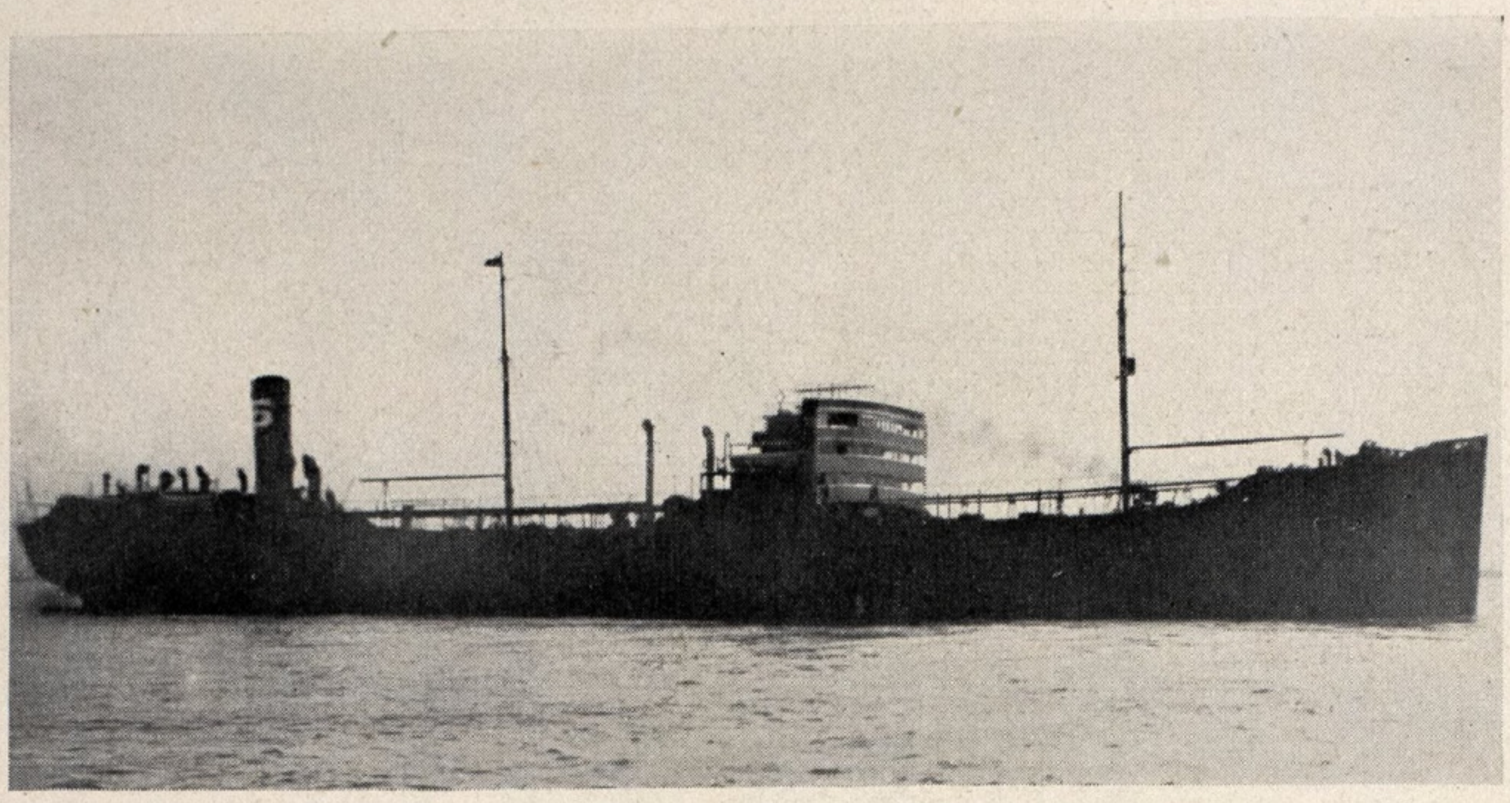
AUXILIARY EQUIPMENT

Pumps—Worthington Pump & Mach. Corp.
Pumps (Cargo)—Four North'n Rotary Pumps
Windlass—Allan Cunningham
Winches—Allan Cunningham
Steering Engine—Hydro Electric, Hyde
Refrigeration—Brunswick-Kroeschell
Oil Burning Equipment—Todd
Life Saving Equip.—Welin Davit & Boat Corp.
Rudder—Oertz Streamline Type
Clocks—Chelsea Clock Co.
Telegraphs (Engine)—Chas. Cory Corp.
Whistle—Allan Cunningham
Evaporator—Distiller—Davis Engineer. Corp.
Feed Water Heaters—Davis Engineer. Corp.
Condensers—Foster Wheeler; Worthington
Condensers (after)—Davis Engineer. Corp.
Soot Blowers—Diamond Power Specialty
Reducing Valves—Foster Engineering Co.
Motors—G. E., Westinghouse, Diehl
Electric Refrigerator—General Electric Co.
Valves—Lunkenheimer Co.
Revolution Counters—Alexander McNab
Radio Equipment—Radio Marine Corp.
Radio Direction Finders—Radio Marine Corp.
Throttle Valves, Injectors—Schutte Koerting
Oil Purifiers—Sharples Specialty Co.
Fathometer—Submarine Signal Co.
Marine Hardware—H. S. Getty & Co.
Gyro Compass—Gyro Pilot—Sperry
Rudder Indicator—Sperry

This vessel and sister ship W. S. FARISH were built on the Isherwood longitudinal bracketless system of framing under special survey of the American Bureau of Shipping and to meet the requirements of the United States steamboat inspection service.



COMET—Tanker—Ocean—Single Screw—Steam



Name—COMET
Owner—Standard Transportation Co.
Builder—Sun Shipbuilding & Dry Dock Co.
Naval Architect—John W. Hudson
Launched—Dec. 9, '30; com., Dec. 31, '30
Classification—American Bureau & Lloyds

HULL PARTICULARS

Length over all, 497 feet 10 inches; length between perpendiculars, 480 feet 6 inches; breadth molded, 65 feet 9 inches; depth molded, 37 feet; draft, 28 feet $10\frac{15}{16}$ inches; displacement loaded, 20,340; gross tonnage, 9153; net tonnage, 5583; deadweight, 14,363 tons; bunker fuel oil capacity in tons, 1800; speed, 11½ knots.

MACHINERY PARTICULARS

Main Engine—One, 4-cylinder quadruple expansion, vertical inverted, steam reciprocating engine, built by the Sun Shipbuilding & Dry Dock Co. Size, 27 x 38½ x 56 x 82 inches and 54 inches stroke; indicated horsepower, 3600 at 75 revolutions per minute.

Boilers—Three, single ended Scotch marine type, built by the Sun Shipbuilding & Dry Dock Co. Size, 16 feet 6 inches in diameter and 12 feet 4½ inches long; fitted for burning oil.

AUXILIARY EQUIPMENT

Manufacturers of:

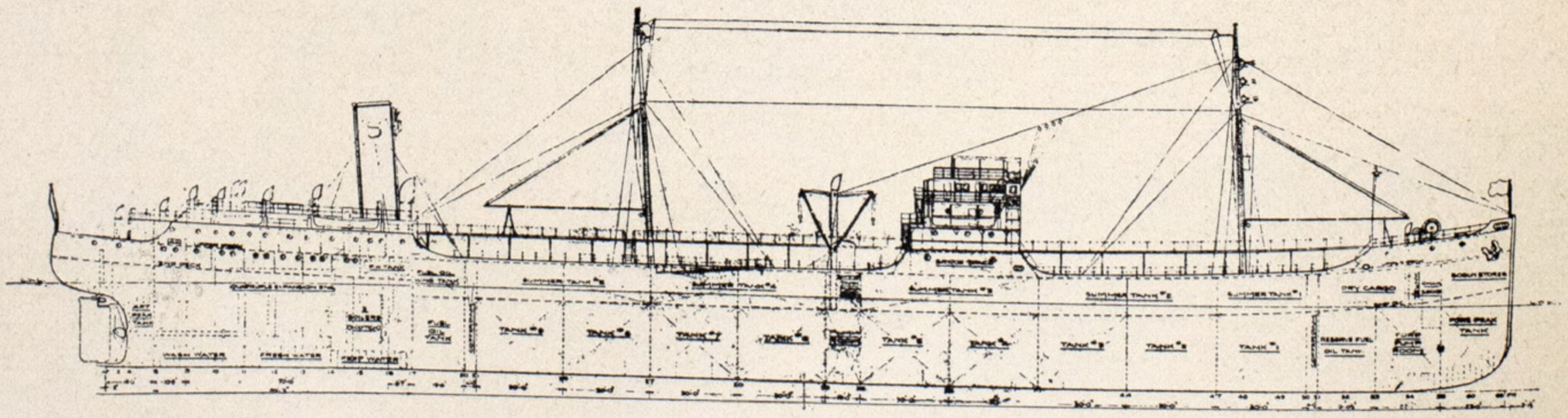
Pumps—Dean; Morris; Worthington
Windlass—American Engineering Co.
Winches—American Engineering Co.
Steering Engine—American Engineering Co.
Propellers—Sun Shipbuilding & D.D. Co.
Refrigeration—Brunswick-Kroeschell
Oil Burning Equipment—Todd
Electric Generators—General Electric Co.
Electric Motors—General Electric; Diehl
Gyro Compass & Pilot—Sperry Gyroscope Co.
Searchlights—Sperry Gyroscope Co.
Anchors—Baldt Anchor, Chain & Forge Corp.
Anchor Chain—National Malleable
Telegraphs—Chas. Cory Corp.
Clocks—Chelsea Clock Co.
Evaporator—Feed Water Heater etc.—Davis
Radio Equipment—Radiomarine Corp.
Radio Direction Finder—Radiomarine Corp.
Shaft Sleeves—Shenango-Penn Mold Co.
Floor Plates—Alan Wood Steel Co.

DESCRIPTION

This vessel in hull construction is practically identical with the tanker BRILLIANT. The longitudinal bracketless system of construction has been used. The radical difference lies in the power, this vessel having a quadruple expansion steam engine. Machinery is located aft and care has been used in the layout.

This vessel, like the BRILLIANT is built on the Isherwood bracketless system of longitudinal ship construction. Inaccessible and exposed parts are coated with bituminous solution and bituminous enamel supplied by W. A. Briggs Bitumen Co.

Officers' accommodations are in the midship deckhouse. Engineers and crew are located aft. The quarters are especially roomy and comfortable with particular care paid to ventilation. Cargo pumps are of the duplex type and can handle large cargoes in good time.



OHIO AND CLASS—River Towboat—Twin Screw—Steam—Electric

Name—OHIO
Owner—Mississippi Valley Barge Line
Builder—The Dravo Contracting Co.
Naval Architect—Cox & Stevens
Engineers—Standard Unit Navigation Co.
Launched—June 17, '30; completed, Sept. 19,
Sister Boats—TENNESSEE; INDIANA and LOUISIANA respectively launched; July 14, '30; June 16, '30; Oct. 9, '30; and completed, Nov. 3, '30; Oct. 11, '30; Dec. 19, '30. The INDIANA and LOUISIANA were built by the Charles Ward Engineering Works.
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 200 feet 10¾ inches; length between perpendiculars, 200 feet; breadth molded, 40 feet; depth molded, 10 feet 6 inches; draft, 6 feet 6 inches; gross tonnage, 1323; net tonnage, 416; bunker fuel oil capacity in short tons, 235; speed, 12 miles per hour without tow.

MACHINERY PARTICULARS

Main Engines—Two, 3-cylinder uniflow built by Skinner Engine Co.; size, 19 inches diameter x 20 inches stroke; horsepower, 2000 for the two engines at 185 revolutions per minute.

In the INDIANA and LOUISIANA the propulsive power consists of one Westinghouse geared turbine generator set of 2500 horsepower at 3600/900 revolutions per minute. This generator supplies current to two Westinghouse motors of 1000 horsepower each direct connected.

Auxiliary Generators—For the OHIO and TENNESSEE, three of 65, 50 and 15 k.w. capacity, Westinghouse. For the INDIANA and LOUISIANA, two Westinghouse of 50 k.w. and 15 k.w.

Boilers—Two, Babcock & Wilcox watertube marine boilers; total heating surface, 4536 square feet; total superheating surface, 454 square feet; working pressure, 260 pounds; superheat, 200 degrees Fahr; fuel, oil. Superheaters, oil burners and other boiler accessories furnished by Babcock & Wilcox Co.

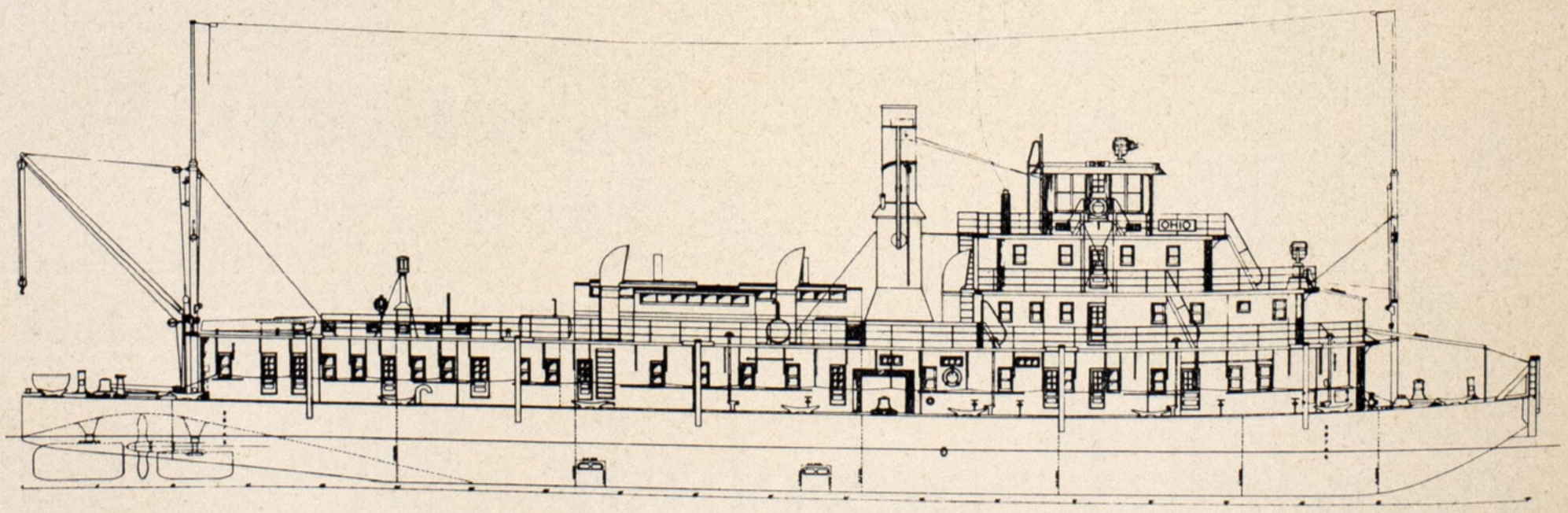
AUXILIARY EQUIPMENT

Pumps—Worthington Pump & Mach. Corp.
Capstans—American Engineering Co.
Steering Engine—Marietta Mfg. Co.
Propellers—Erie Forge Co.
Refrigeration—York Ice Machinery Co.
Marine Hardware—The Dayton Mfg. Co.
Feed Water Heater—Davis Engineering Corp.
Evaporator—Distiller—Davis Engineering
Condenser—Foster Wheeler Corp.
Soot Blowers—Diamond Power Specialty
Valves and Fittings—Wm. Powell Co.
Radio Equipment—Radiomarine Corp.
Oil Purifier—The Sharples Specialty Co.

DESCRIPTION

Four vessels of this type were built for Mississippi river service. All four are tunnel stern twin screw propelled and each has a total of about 2000 horsepower. The OHIO and TENNESSEE are fitted with steam reciprocating engines and the INDIANA and LOUISIANA are fitted with turbine electric drive, the first time this type of machinery has been installed in a river craft.

The OHIO and her sister boats are unique. It is the first time, it is safe to say, that so much study has been put into the plans for craft of this kind by a private operator. The vessels are twin screw, tunnel stern of substantial construction and high power and are now in use for long distance towing on the lower Mississippi. A special type of barge was also developed. These barges have V shaped ends so that they can stow compactly in a large tow. Ten of these barges are handled by each towboat where express service is required and as many as 20 barges may be towed.



CITY OF MILWAUKEE—Carferry—Great Lakes—Twin Screw—Steam

Name—CITY OF MILWAUKEE
Owner—Grand Trunk Railway Co.
Builder—Manitowoc Shipbuilding Corp.
Naval Arch.—Manitowoc Shipbuilding Corp.
Launched—Nov. 25, '30; comp. Jan. 15, '31
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 360 feet; length between perpendiculars, 348 feet; breadth molded, 56 feet; depth molded, 21 feet 6 inches; draft, mean, designed, 16 feet; displacement loaded, (designed), 6300 short tons; gross tonnage, 2942; net tonnage, 1488; passenger capacity, 100; cargo capacity, 26 to 30 loaded freight cars; bunker fuel capacity, in tons of coal, 375 (short tons); speed, 14 statute miles per hour.

MACHINERY PARTICULARS

Main Engines—Two, 3-cylinder triple expansion steam engines, built by Manitowoc Shipbuilding Corp. Size, 20½ x 34 x 56 inches and 36 inches stroke; indicated horsepower each engine, 1400 at 96 revolutions per minute.

Boilers—Four, scotch marine type, built by Manitowoc Shipbuilding Corp. Size, 14 feet 6 inches in diameter by 12 feet in length; working pressure, 190 pounds per square inch; fuel, coal hand fired.

Auxiliary Generators—Two, Engberg, reciprocating engine driven, 20 kilowatts each. Built by Troy Engine and Machine Co.

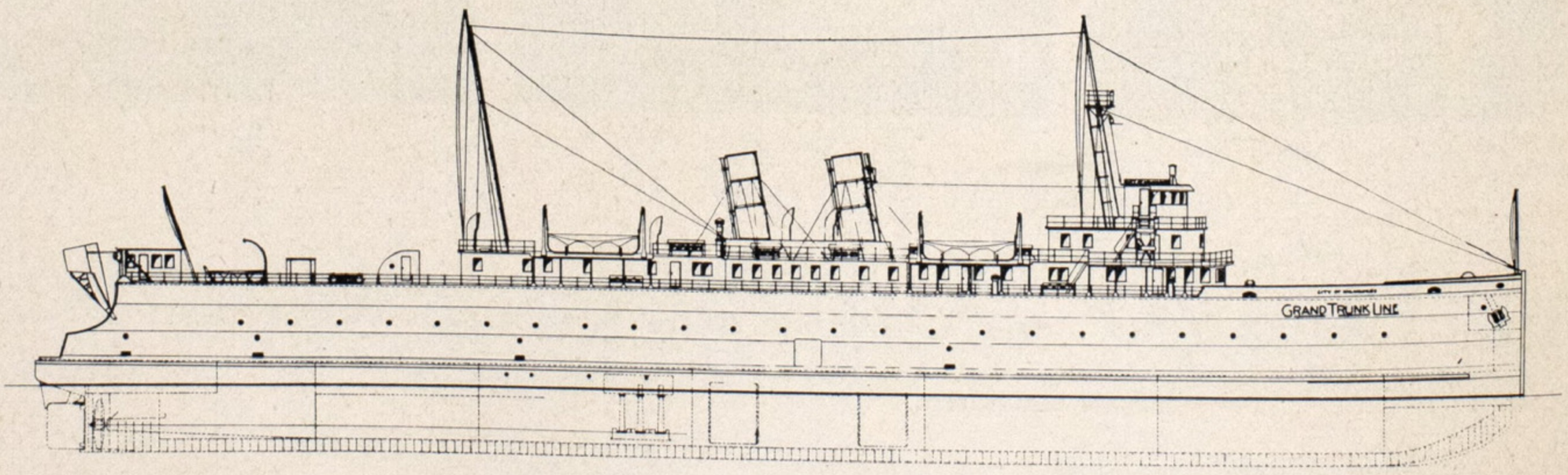
AUXILIARY EQUIPMENT

Pumps—Union; Dean; Kingsford
Windlass—Manitowoc Shipbuilding Corp.
Steering Engine—Manitowoc Shipbuild. Corp.
Propellers—Manitowoc Shipbuilding Corp.
Refrigeration—Copeland
Radio Compass—MacKay (Kolster)
Telegraphs—Chas. Cory Corp.
Marine Hardware—The Dayton Mfg. Co.
Oil Purifiers—De Laval
Deck Covering—Selby, Battersby & Co.
Shaft Sleeves—Shenango-Penn Mold Co.
Generator (Emergency)—One 5 k.w. Kohler

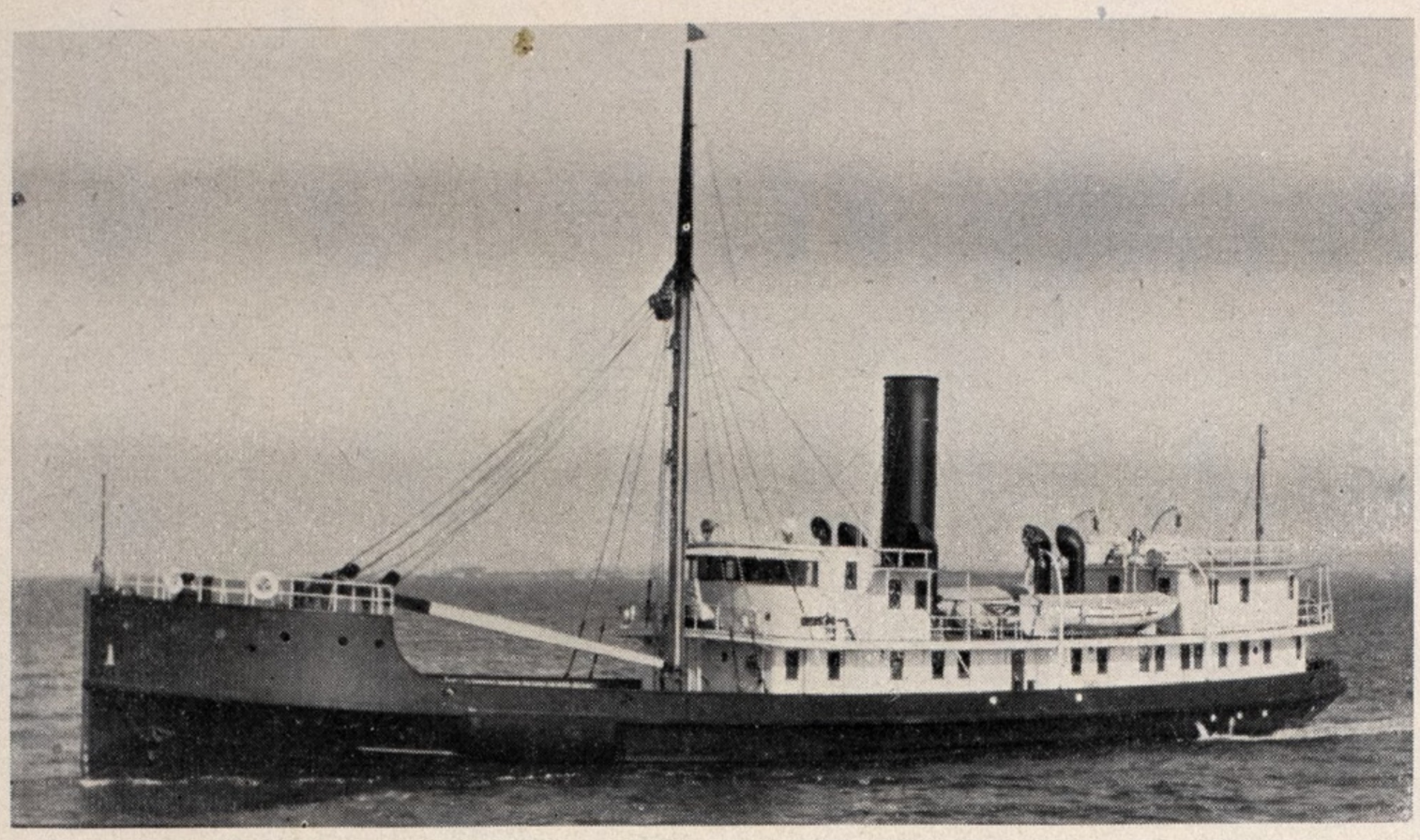
The CITY OF MILWAUKEE is the latest of a long series of carferries built by the Manitowoc Shipbuilding Corp. for service on the Great Lakes. She is now in use by the Grand Trunk system for ferrying cars across Lake Michigan. Of orthodox design throughout, the new vessel is practically a duplicate of two recently constructed carferries for the same company and is heavily constructed for severe winter operating conditions. Construction began early in 1930 and was carried out under the supervision of Capt. C. E. McLaren, marine superintendent in charge of carferry operation.

DESCRIPTION

For service on Lake Michigan between Milwaukee and Muskegon. Can carry 30 loaded 42-foot freight cars and 100 passengers. Propelled by two triple expansion marine engines of 1400 horsepower each at a service speed of 15 miles. Similar to the CITY OF MADISON and CITY OF GRAND RAPIDS. Total cost of this carferry is about $1,000,000.



VIOLET—Lighthouse Tender—Twin Screw—Steam



Name—VIOLET
Owner—United States Bureau of Lighthouses
Builder—Manitowoc Shipbuilding Corp.
Naval Architect—Bureau of Lighthouses
Launched—April 12, '30; completed, Aug. 22.
Classification—Owner's requirements

HULL PARTICULARS

Length over all, 170 feet; length between perpendiculars, 163 feet 6 inches; breadth molded, 32 feet; depth molded, 13 feet; draft, 8 feet 6 inches; displacement loaded, 770 tons in salt water; bunker fuel oil capacity in tons, 100 of which 80 tons are in the bunkers and 20 tons in the settling tanks; speed 13¼ statute miles per hour.

MACHINERY PARTICULARS

Main Engines — Two, 3-cylinder, inverted, triple expansion steam engines built by Manitowoc Shipbuilding Corp.; size, 11½ x 19 x 32 inches x 24 inches stroke; indicated horsepower at 140 revolutions per minute is 450 for each engine.

Boilers—Two, Babcock & Wilcox water tube marine boilers of the small tube type, with a total heating surface of 4880 square feet; working pressure 225 pounds; fuel, oil. The oil burners and the furnace firebrick were also supplied by the Babcock & Wilcox Co.

Auxiliary Generators—Two of Engberg type, 7½ k.w. each, furnished by Troy Engine & Machine Co.

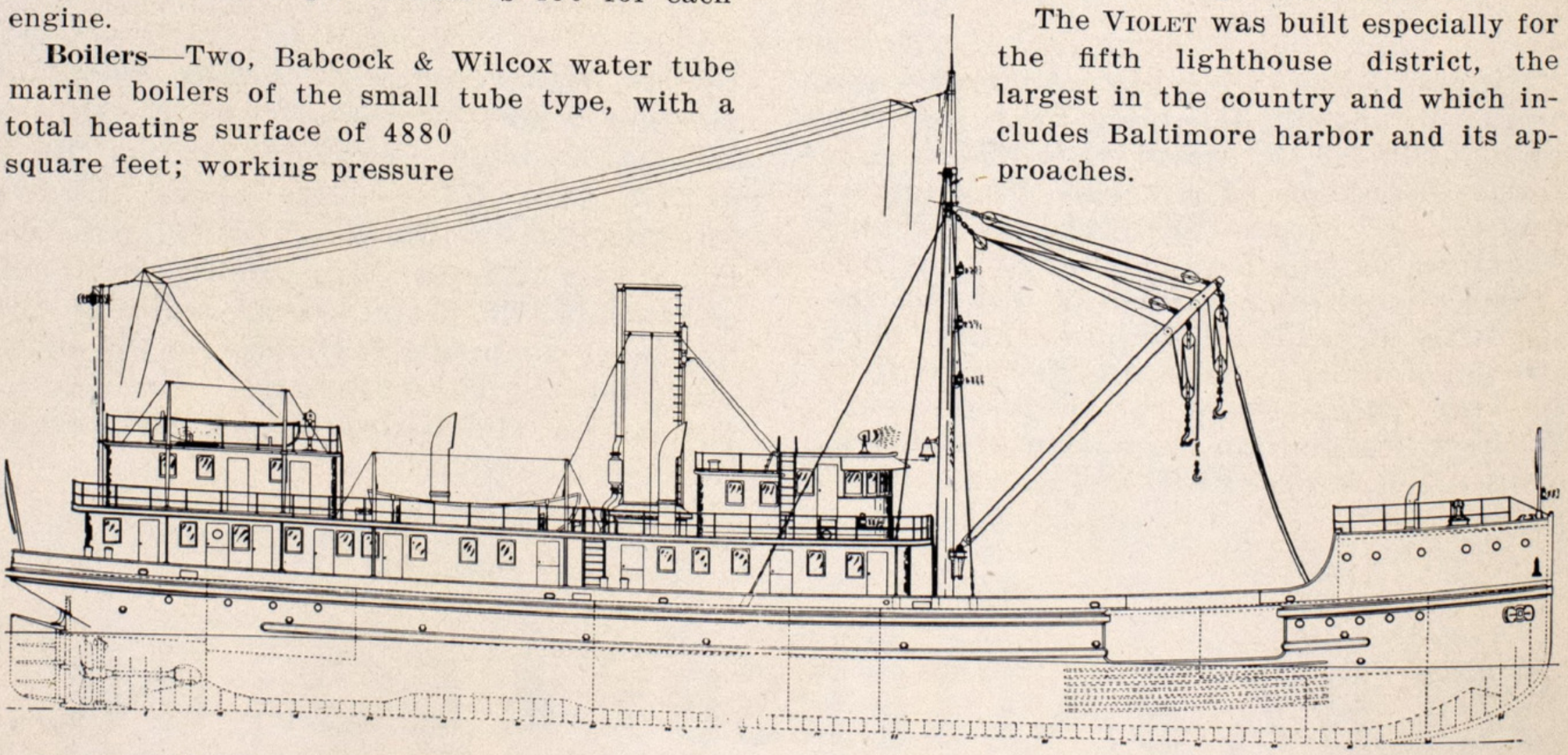
AUXILIARY EQUIPMENT

Pumps—Worthington Pump & Mach. Corp.
Windlass—Hyde Windlass Co.
Winches—Lidgerwood Mfg. Co.
Steering Engine—Hyde Windlass Co.
Propellers—Manitowoc Shipbuilding Corp.
Refrigerating Machinery—Frigidaire
Oil Burning Equipment—Schutte & Koerting with Babcock & Wilcox Mayflower burners
Telegraphs—Chas. Cory Corp.
Feed Water Treatment—Filtrators Co.
Windows—Kearfott Engineering Co.
Revolution Counters—Alexander McNab
Anchor Chain—National Malleable Co.
Shaft Sleeves—Shenango-Penn Mold Co.

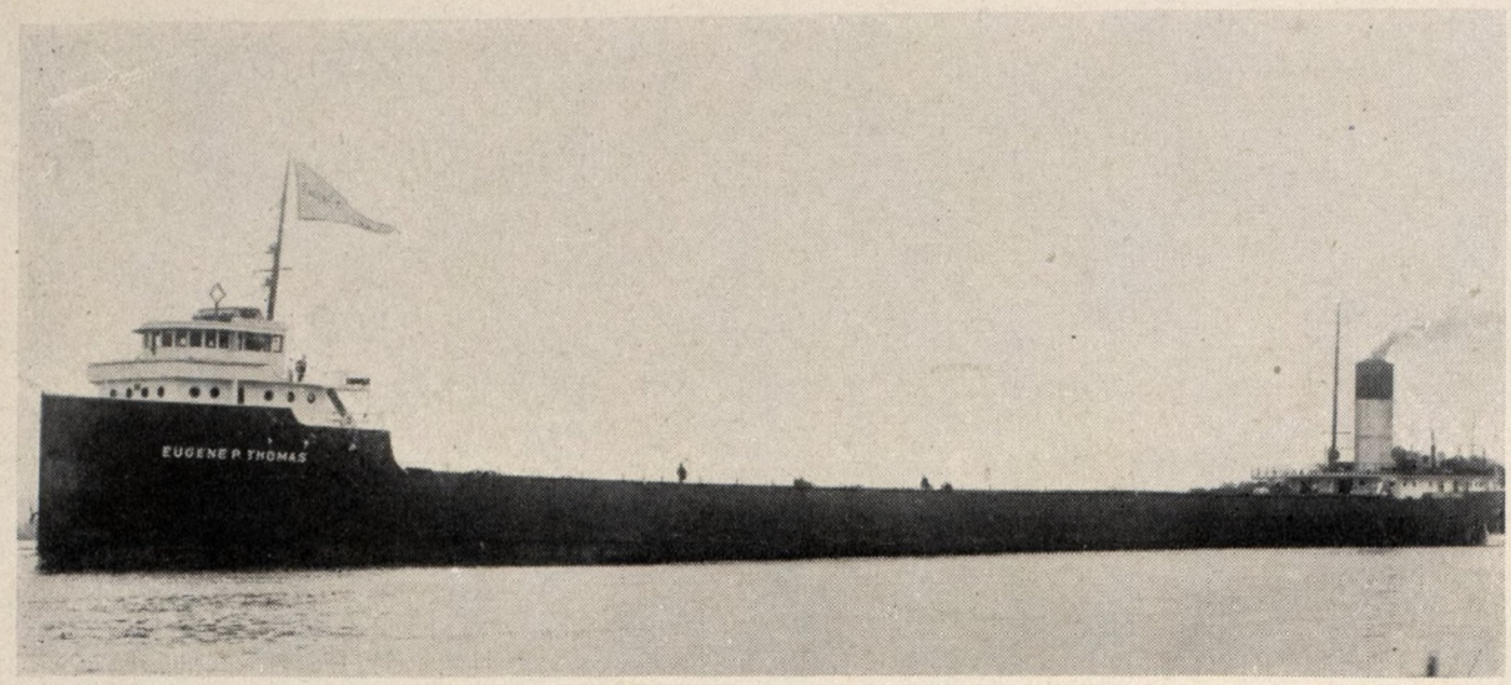
DESCRIPTION

Of conservative engineering design with reciprocating steam engines and watertube boilers of nominal pressure, this vessel is still of much interest in her refinements and the high order of workmanship. Her station is on the waters of Chesepeake bay. The derrick equipment received special attention, the boom and mast having a lifting capacity of 20 tons.

The VIOLET was built especially for the fifth lighthouse district, the largest in the country and which includes Baltimore harbor and its approaches.



EUGENE P. THOMAS—Freighter—Great Lakes—Single Screw—Steam



Name—EUGENE P. THOMAS
Owner—Pittsburgh Steamship Co.
Builder—Great Lakes Engineering Works
Launched—March 8, '30; completed, May 5,
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 604 feet; length between perpendiculars, 580 feet; breadth molded, 60 feet; depth molded, 32 feet; draft, 20 feet; displacement loaded, 18,870 short tons; gross tonnage, 7860; net tonnage 6201; cargo capacity, 12,000 long tons; cargo capacity in cubic feet, 540,000; bunker fuel capacity, 500 short tons of coal; speed, 12 miles per hour.

MACHINERY PARTICULARS

Main Engine—One, triple expansion reciprocating steam engine built by the Great Lakes Engineering Works. Size, 24½ x 40 x 65 inches and 42-inch stroke; indicated horsepower, 2200 at 85 revolutions per minute.

Boilers—Three, scotch type, built by Manitowoc Shipbuilding Corp. Size, 14 feet in diameter by 12 feet long. Working pressure, 190 pounds per square inch. Fuel, coal hand fired.

AUXILIARY EQUIPMENT

Pumps—Dean Bros.
Windlass—Hyde Windlass Co.
Winches—Hyde Windlass Co.
Steering Engine—Hyde Windlass Co.
Gyro Compass—Sperry Gyroscope Co.
Propellers—Great Lakes Engineering Works
Refrigeration—Detroit Ice Mach. Co. (Frick)
Electric Generators—Crocker-Wheeler generators and American Blower Co. engines
Marine Hardware—The Dayton Mfg. Co.
Anchor Chain—National Malleable Co.
Condenser (Auxiliary)—Worthington

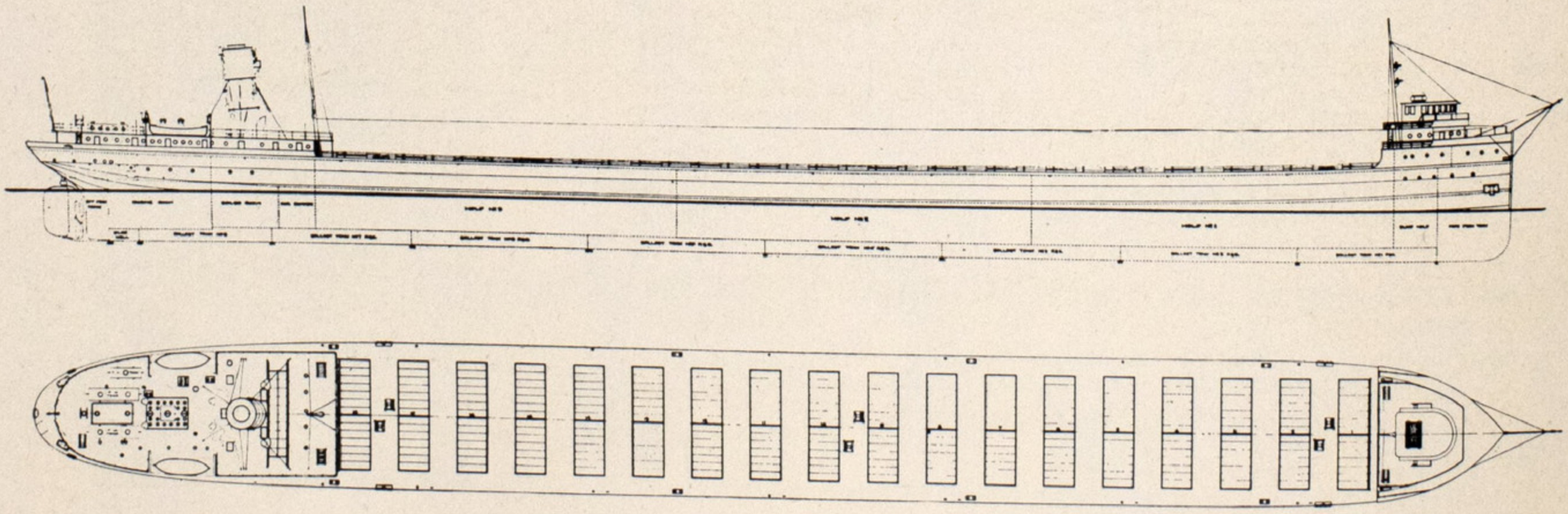
DESCRIPTION

This vessel is similar to the steamers A. F. HARVEY and MYRON C. TAYLOR, built by the same shipyard in 1927 and 1929 respectively. Eighteen hatches, each 38 feet wide and 12 feet fore and aft serve the cargo hold which is divided into three compartments for cargo.

The EUGENE P. THOMAS, a typical modern Great Lakes bulk freighter is practically a duplicate of the A. F. HARVEY and MYRON C. TAYLOR both built by the same company except that in the latter case, watertube boilers were used. This vessel is designed for carrying bulk cargoes of iron ore, coal, or grain.

The bottom and spar decks are framed on the longitudinal system and the sides are framed on the transverse system. Side tanks are sloped so that at the bottom they are directly below the outboard edge of the hatch. There is one spare room in the texas. Aside from this there are no quarters for passengers.

Arrangement of quarters, construction and details generally, are according to the regular Pittsburgh Steamship Co's. standards and are practically identical with the HARVEY and the TAYLOR. This vessel was named after vice president of the United States Steel Corp. and was christened by Miss Mary Caroline Hughes of New York City.



WILLIAM DICKINSON—River Towboat—Twin Screw—Diesel

Name—WILLIAM DICKINSON
Owner—Marquette Cement Co.
Builder—Marietta Mfg. Co.
Naval Architect—T. R. Tarn
Completed—October, 1930
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall, 125 feet; length between perpendiculars, 124 feet; breadth molded, 26 feet; depth molded, 7 feet; draft, 5 feet 6 inches; displacement loaded, 384 tons; gross tonnage, 390; bunker fuel capacity in tons, 40; speed, 12 statute miles per hour.

MACHINERY PARTICULARS

Main Engines—Two, 6-cylinder, 4 cycle, solid injection, direct reversible diesel engines built by the Atlas-Imperial Diesel Engine Co. Size, 14 inches in diameter by 18 inches stroke, each engine develops 350 horsepower at 225 revolutions per minute and have reserve power should it be required.

Auxiliary Generators—Two, three-cylinder, 4½ x 6 inches, direct driven 12½-kilowatt generator compressor sets, self contained on a common bedplate; Cummins engines. The air compressors are Ingersoll-Rand, 5 x 2¼ x 4 inches in size driven through friction clutches from the engine generator shafts.

DESCRIPTION

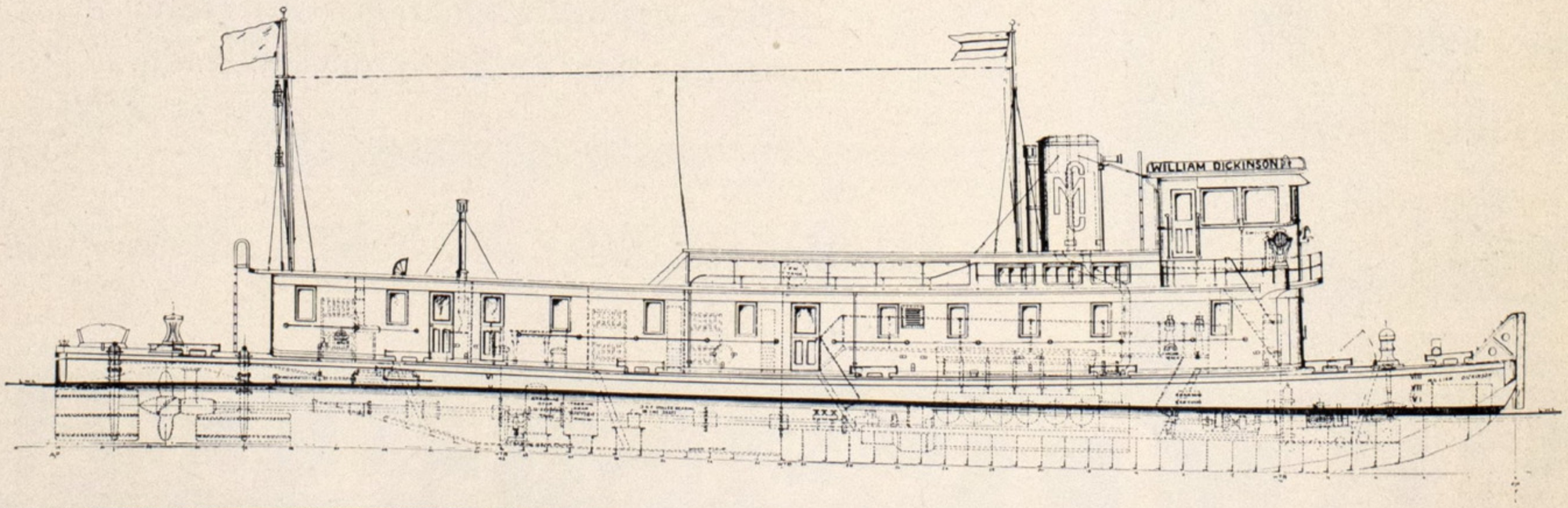
This vessel was designed for towing bulk cement barges on the Mississippi and is now in operation from the Cape Girardeau, Mo., plant of the owner to St. Louis and Memphis. The steel hull is of open tunnel type with modified scow bow, square transom stern, round bilges and is framed transversally. Two diesel engines.

AUXILIARY EQUIPMENT

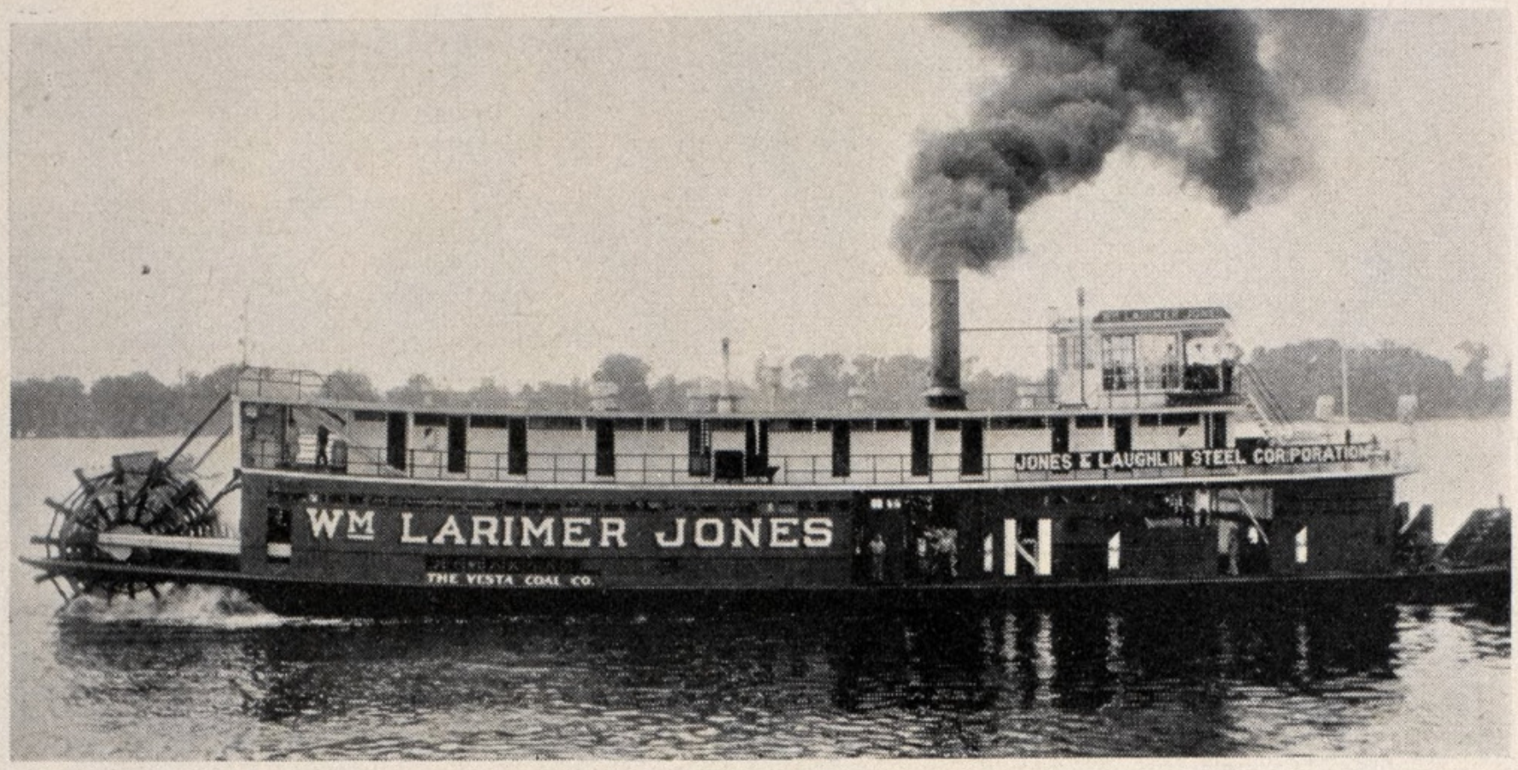
Manufacturers of:
Pumps—Gould; Viking
Capstans—Marietta Mfg. Co.
Steering Engine—Marietta Mfg. Co.
Propellers—F. Ferguson & Son
Refrigeration—Frigidaire
Marine Hardware—The Dayton Mfg. Co.
Oil Purifiers—De Laval Separator Co.
Thrust Bearings—Kingsbury Mach. Works
Searchlights—Carlisle & Finch Co.
Telephone System—S. H. Couch Tel. Co.
Telegraphs—Chas. Cory Corp.
Valves & Fittings—Crane Co.
Fire Prevention—Lux System

The propellers are four-bladed solid wheels, of semi-steel, 6 feet in diameter with a pitch of 63 inches and turn inboard. The tunnels, or more correctly half tunnels, in section are semi-hexagonal in shape which seems to be something new in tunnel design, the principal being that a semi-circular section would offer less resistance to rotary motion of the water. By disturbing this rotary action it is believed that an increase in thrust is obtained.

Reports of actual operation of this vessel during several months indicates satisfactory performance in all respects.



WM. LARIMER JONES—River Towboat—Stern Wheel Steam



Name—WM. LARIMER JONES
Owner—Vesta Coal Co.
Builder—Howard Ship Yards & Dock Co.
Naval Architect—Vesta Coal Co. Design
Launched—Feb. 24, '30; completed, July 2,
Sister Boat—TITAN; launched, Apr. 5, '30; completed Sept. 17, '30

HULL PARTICULARS

Length over all, 163 feet 8 inches; length between perpendiculars, 139 feet 6 inches; breadth molded, 34 feet; depth molded, 7 feet 4½ inches; draft, 5 feet; displacement loaded, 660 tons; gross tonnage, 511; net tonnage, 192; number in crew, 24 men; bunker fuel capacity, in coal, 120 tons; speed, 8 to 10 statute miles per hour.

MACHINERY PARTICULARS

Main Engines—Two tandem compound condensing steam engines built by Frisbie Engine Co. Size, 14 x 28 inches x 8 feet stroke; indicated horsepower, 600 for each engine at 25 revolutions per minute.

Boilers—Two Foster Wheeler marine water-tube type boilers; total heating surface, 3272 square feet; fuel, coal.

AUXILIARY EQUIPMENT

Manufacturers of:

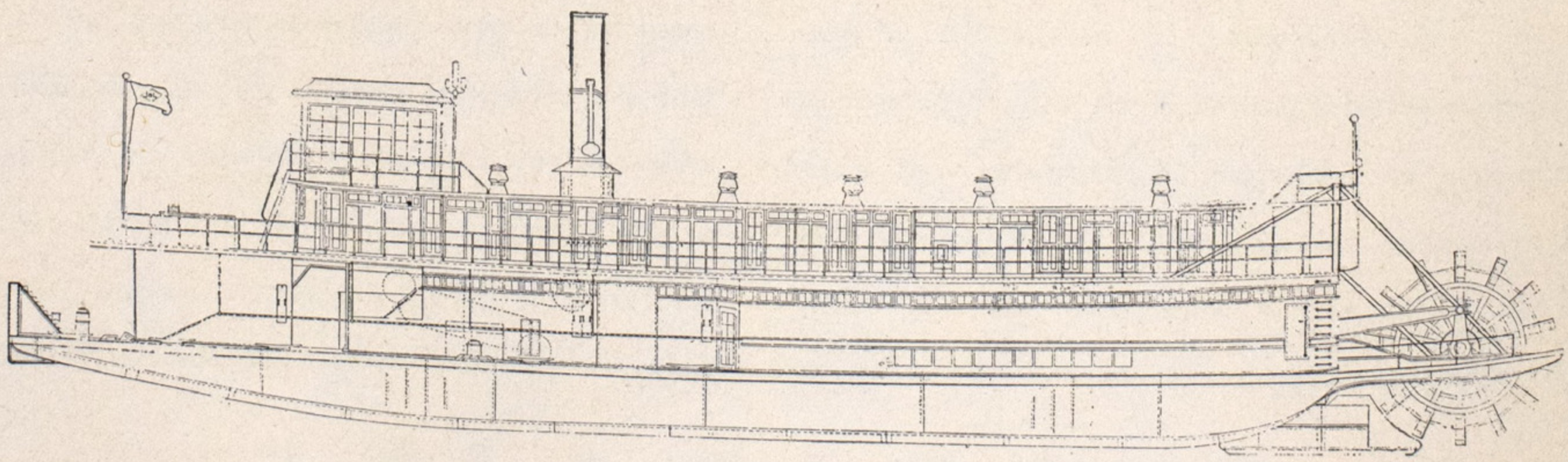
Pumps—Worthington Pump & Mach. Corp.
Capstans—American Engineering Co.
Steering Engine (hydraulic)—Marietta
Steering Winch (aux. electric)—Lidgerwood
Electric Refrigerators—General Electric Co.
Condenser—Worthington Pump & Mach.
Superheaters—Foster Wheeler Corp.
Electric Generators—Elliott Co.
Soot Blowers—Diamond Power Specialty
Valves—Lunkenheimer
Telegraph System—Chas. Cory Corp.

DESCRIPTION

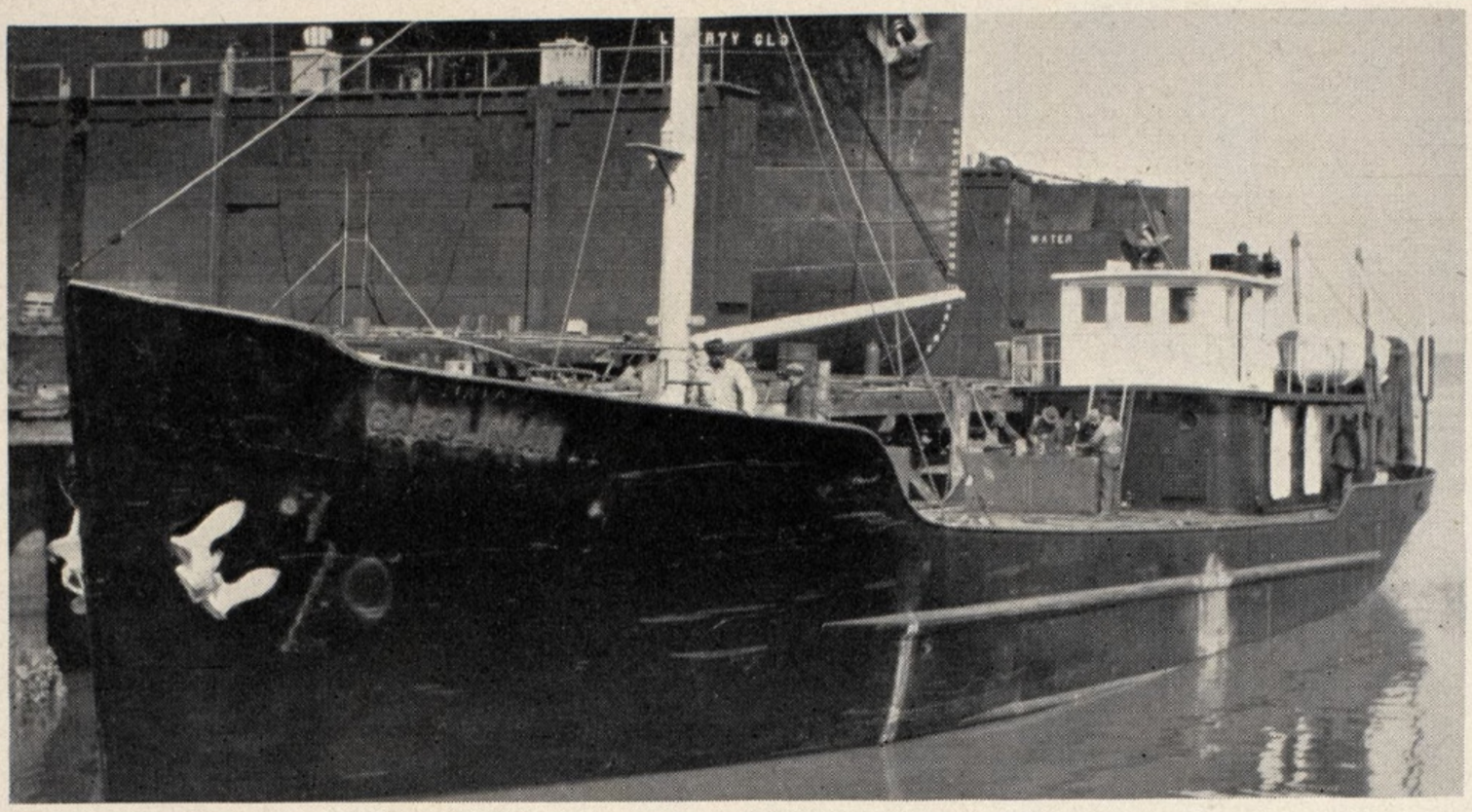
This vessel and her sister steamer TITAN, though following orthodox design are modern in their special fitness for towing coal from the mines to the mills of the owner in the Pittsburgh district. The steering gear is of both hydraulic ram type and, electric to be used in an emergency.

The WM. LARIMER JONES and sister boat TITAN are operating around Pittsburgh primarily in towing coal from the mines to the mills of Jones & Laughlin Steel Corp. The hulls are of steel as is also the superstructure up to and including the boiler deck. The cabin and pilot house are built of wood.

Modern equipment includes, all metal beds, wash basins and mirrors in each room in addition to three crew's shower baths. There are two General Electric refrigerators and four General Electric drinking fountains; four Ventura-fin heaters in addition to steam radiators in all bathrooms. There are two electrically controlled searchlights. Every care has been taken to insure safety, including engine indicators in the pilot house, and particularly the steering mechanism, in having a separate electric steering gear ready to be used in an emergency as a standby for the regular hydraulic ram gear ordinarily in use. The changeover only takes 40 seconds.



CAROLINIAN—Tanker—Coastwise—Single Screw—Diesel



Name—CAROLINIAN
Owner—M. L. Clark
Builder—Charleston Dry Dock & Mach. Co.
Naval Architect—R. F. Smith
Launched—Feb. 14, '30; completed, Mar. 10.
Classification—Owner's requirements

HULL PARTICULARS

Length over all, 120 feet; length between perpendiculars, 108 feet; breadth molded, 23 feet; depth molded, 10 feet; draft loaded, 8 feet 6 inches; displacement loaded, 440 tons; gross tonnage, 226; net tonnage, 157; cargo capacity, 125,000 gallons; in cubic feet, 16,711; bunker diesel fuel capacity, in gallons, 3500; speed, loaded in service, 9 knots.

MACHINERY PARTICULARS

Main Engine—One, marine diesel, 6-cylinder engine built by Fairbanks-Morse Co. Size, 10-inch diameter cylinders by 12½ inches stroke; shaft horsepower 180 at 400 revolutions per minute.

Electric Generator—One 750 watts Fairbanks-Morse lighting plant.

AUXILIARY EQUIPMENT

Manufacturers of:

Pumps—Northern Pump Co.
Windlass—Hyde Windlass Co.
Winches—Hyde Windlass Co.
Steering Engine—Hand steering gear
Propellers—Columbian Bronze Co.
Telegraphs—Chas. Cory Corp.
Marine Hardware—The Dayton Mfg. Co.

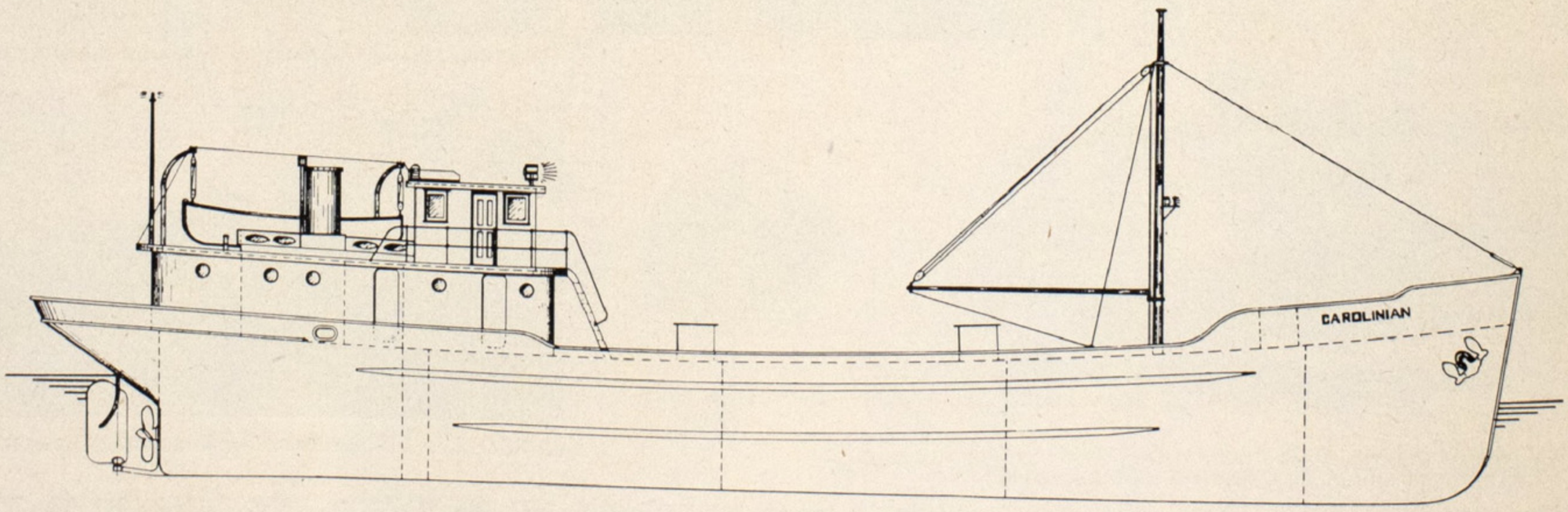
DESCRIPTION

A single deck, diesel direct propelled, tanker with a capacity of 125,000 gallons. Said to be the first completely all-welded vessel in the world. A special system of construction has been used. The CAROLINIAN is in service as a bulk oil carrier from Elizabeth City, N. C. to adjacent ports.

REMARKS

The CAROLINIAN has been built on the R. F. Smith lock notch system of welding of which the Charleston Dry Dock & Machine Co. is the sole licensee. In the description of this system it is stated that it does away entirely with angles, shapes, rivets and bolts. A system of dovetailing locks the plates together, giving additional strength. The cost of construction is said to be reduced and the carrying capacity is increased. The CAROLINIAN, which was one of the first vessels built on this system, after a year's service, is reported to be operating in an entirely satisfactory manner.

The bottom shell of the vessel and the deck are built in a similar manner with eleven (including centerline bulkhead) longitudinals 4 x ⅜-inch. Spaced about every six feet to deck and bottom are 12-inch by 12½-pound transverse webs from side to side bracketed to the longitudinals and to similar side webs. Quarters for officers and crew are located on the poop deck with pilot house above. One 2-ton winch serves a 20-foot boom located forward.



N. Y. C. NO. 35—Lighter—Harbors—Single Screw—Diesel

DESCRIPTION

The New York Central is the owner of a large fleet of harbor craft of all kinds. Its marine department in charge of this floating equipment is constantly trying to reduce cost of operation. Lighter No. 35 is propelled by a powerful diesel engine direct connected to propeller. Cruising speed is estimated at eight knots.

Name—N. Y. C. No. 35
Owner—New York Central Railroad Co.
Builder—United Dry Docks, Staten Island
Naval Architect—J. W. Millard & Bro.
Launched—Aug. 12, '30; comp. Oct. 15, '30
Classification—Owner's requirements

HULL PARTICULARS

Length over all, 122 feet; length between perpendiculars, 108 feet; breadth molded, 32 feet 6 inches; depth molded, 14 feet 6 inches; draft, 8 feet 9 inches; gross tonnage, 532; net tonnage, 362; bunker fuel oil capacity, in gallons, 6000; in short tons, 24; speed, cruising, 8 knots.

MACHINERY PARTICULARS

Main Engine—One, Ingersoll-Rand solid injection diesel engine. Size, 16 x 22 inches, 600 horsepower at 240 revolutions per minute.

AUXILIARY EQUIPMENT

Manufacturers of:

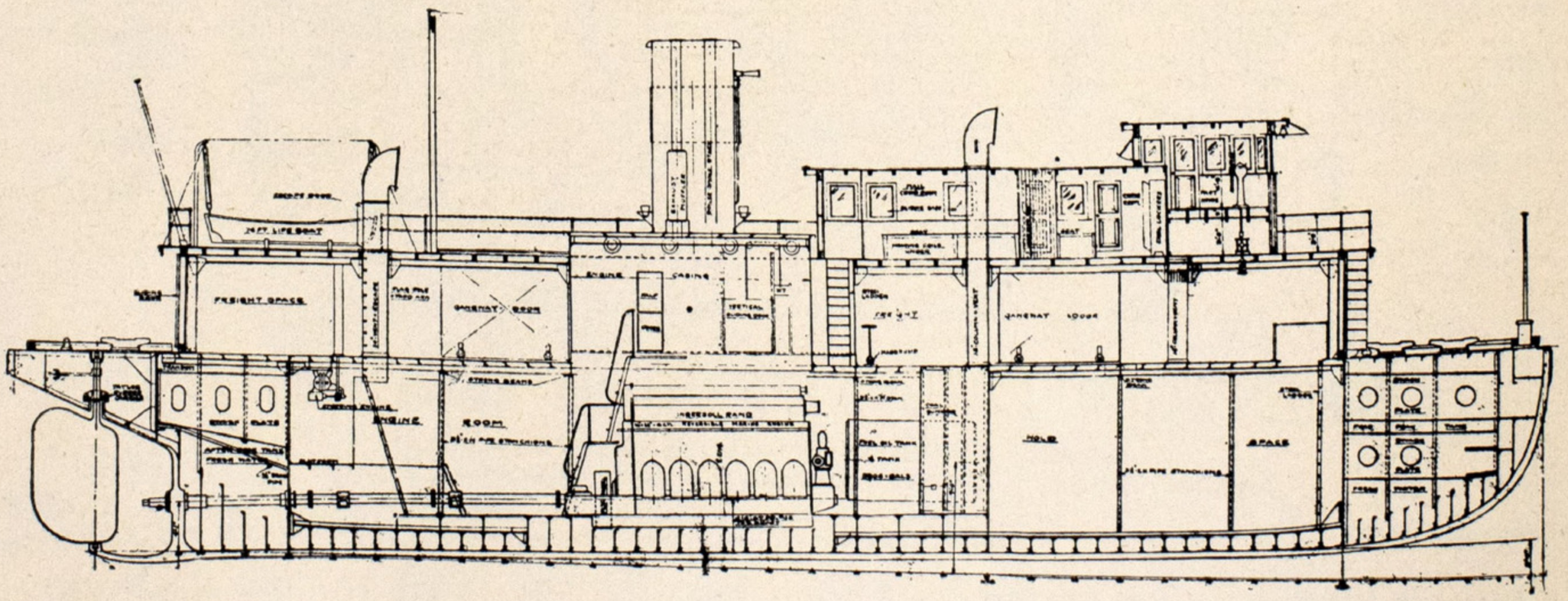
Pumps—Fairbanks-Morse
Steering Engine—United Dry Docks
Propellers—United Dry Docks
Electric Generators—Diehl Mfg. Co.
Telegraphs—Chas. Cory Corp.
Oil Purifiers—De Laval Separator Co.

REMARKS

This lighter is of heavy construction and is of especially seaworthy design. Of single screw diesel drive the vessel is at all times immediately ready for operation and while not being used there is a minimum expense for power. It is of the covered type and is used for the transfer of more valuable freight requiring protection from sea and weather. With the addition of Lighter No. 35, the New York Central fleet now consists of 45 self-propelled boats plying the waters around Manhattan.

The proportion of beam to length is somewhat greater than in the tugboat type giving greater deck room and increased stability and seaworthiness. A cruising speed of eight knots is possible with the single 600 horsepower diesel engine direct connected to the propeller. That this vessel is of heavy substantial construction and fully equipped in every way is indicated by the period of time necessary for construction. The keel was laid in February 1930; launching took place Aug. 12, and the lighter was completed and delivered Oct. 15, 1930. With a fuel capacity of 24 tons, she has a cruising radius, when operating 10 hours a day, of about 16 days.

It will be interesting to observe her performance in practical service. The experience so gained will point quite definitely to the most satisfactory type of power for this important class of vessel for harbor work.



MAINE—Otter Trawler—Ocean—Single Screw—Diesel

Trawler Illinois (Hull 142) sister ship of the Maine

Name—MAINE (Hull No. 143)
Owner—Red Diamond Trawler Co.
Builder—Bath Iron Works Corp.
Naval Architect—Bath Iron Works Corp.
To Be Launched—April 4, '31; to be completed, about April 15, '31
Sister Ship—ILLINOIS—Launched, March 19, '30; to be completed about April 1, '31
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 132 feet 4 inches; length between perpendiculars, 121 feet 7 inches; breadth molded, 24 feet; depth molded, 13 feet; draft aft, 12 feet; at midships, 10 feet; displacement loaded, about 490 tons; gross tonnage, about 260; net tonnage, about 115; cargo capacity, in tons of fish and ice, 140; in cubic feet, 7270; bunker diesel fuel oil capacity in gallons, 15,180; speed estimated, 11 knots.

MACHINERY PARTICULARS

Main Engine—One, two-cycle single acting diesel engine, built by Fairbanks Morse Co. Size, six cylinders, 14-inch bore by 17-inch stroke; brake horsepower, 550 at 260 r.p.m.

Boiler—One, vertical fire tube boiler for heating, built by Orr & Semblower. Size, 61 square feet of heating surface; fuel, oil.

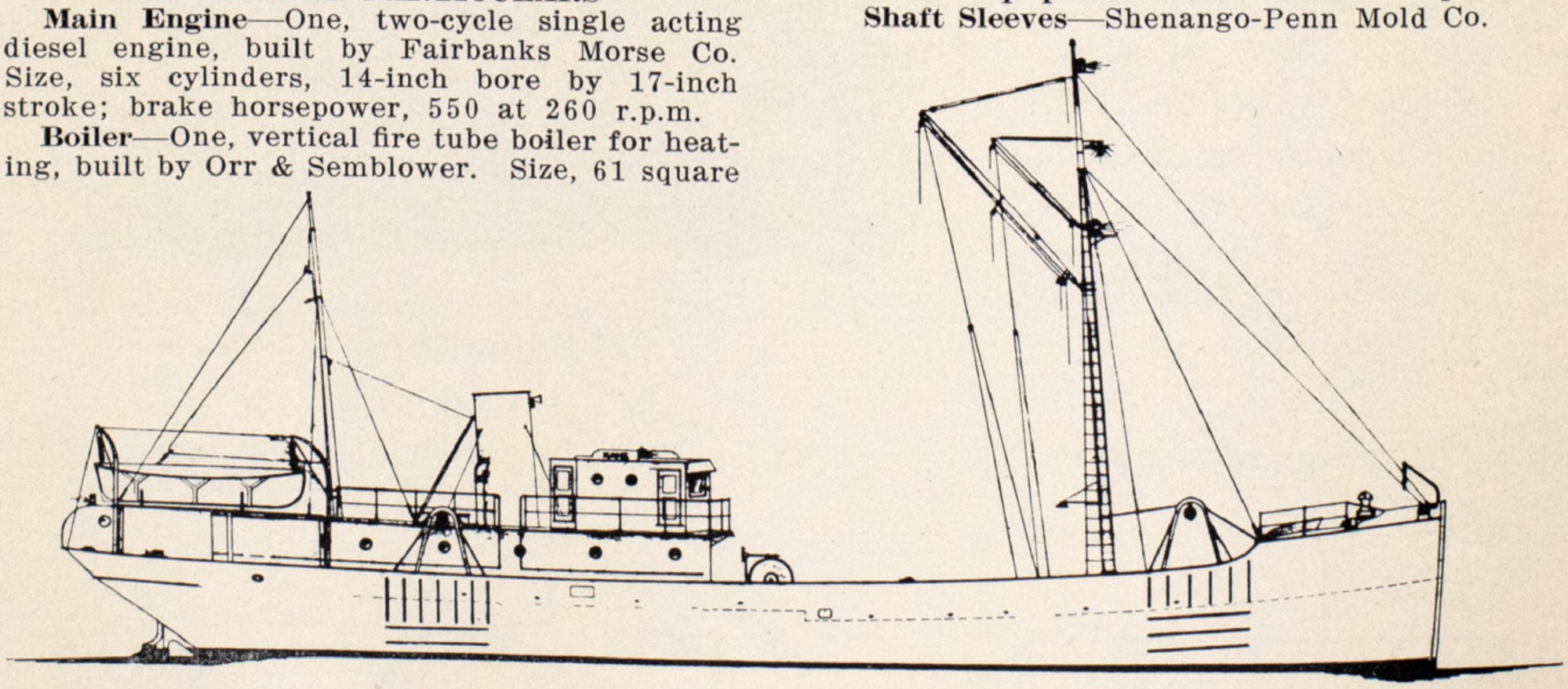
Electric Generators—One for trawl winch, built by Fairbanks Morse Co. Size, 80 kilowatts, 230 volts, direct current, driven by four-cylinder diesel engine. Supplies current for one 85-horsepower, 230-volt direct current electric motor for trawl winch. One auxiliary generator 20 k.w., furnished by Fairbanks Morse.

AUXILIARY EQUIPMENT

Pumps—Fairbanks Morse Co.
Windlass—Hyde Windlass Co.
Winches—Bromfield Mfg. Co.
Winch Motor (85 H.P.)—Diehl Mfg. Co.
Steering Engine (hand)—Edson Mfg. Co.
Propellers—Hyde Windlass Co.
Oil Burning Equip. (heating boiler)—Ray
Deck Equipment—Bromfield Mfg. Co.
Telegraphs—Chas. Cory Corp.
Windows—Kearfott Engineering Co.
Radio Equipment—Radiomarine Corp.
Shaft Sleeves—Shenango-Penn Mold Co.

DESCRIPTION

During 1930 this shipyard continued building ocean-going diesel propelled trawlers, but it was principally occupied by building large and elaborate yachts. This vessel is similar to the EBB and FLOW described a year ago. Of substantial steel construction, single deck, large fish hold forward of amidships, with machinery space aft of midships. Propulsion is by single diesel engine direct connected to the propeller. Quarters for 12 in the crew are located forward in the forecastle head. The captain's room is located on the bridge aft of the wheelhouse. The chief engineer, second engineer, radio operator and cook are located in quarters on the main deck aft. These ocean going trawlers are fine able sea boats and are strongly built to stand heavy weather.



FRYING PAN (Lightship No. 115 & Class)—Single Screw—Diesel Electric

Name—FRYING PAN (Lightship No. 115)
Owner—Bureau of Lighthouses
Builder—Charleston Dry Dock & Mach. Co.
Naval Architect—Bureau of Lighthouses
Launched—Aug. 13, '29; completed Apr. 9, '30
Sister Ship—FENWICK (Lightship No. 116); NANTUCKET (Lightship No. 117); respectively launched, Oct. 22, '29; Mar. 15, '30; completed June 23, '30; Sept. 3, '30. Also Lightships 100, 113, 114 respectively BLUNTS, SWIFTSURE, FIRE ISLAND, built by the Albina Marine Iron Works

HULL PARTICULARS

Length over all, 133 feet 3 inches; length between perpendiculars, 108 feet 9 inches; breadth molded, 30 feet; depth molded, 15 feet to main deck; draft, 11 feet 9 inches forward, 13 feet 3 inches aft; displacement loaded, 630 tons; bunker diesel fuel oil capacity in tons, 80; in gallons, 20,000; speed, 9 knots.

MACHINERY PARTICULARS

Main Engines—Four, Winton marine diesel engines of 112 horsepower each at 400 revolutions per minute.

Main Generators—Four, General Electric, each direct connected to one of the diesel engines described above. Size, each 75 kilowatts 113 horsepower; no exciters; direct current propelling motor; one General Electric, 350 shaft horsepower—125 volts at 300 revolutions per minute.

Auxiliary Generators—Two, each 7½ kilowatts, General Electric, driven by Cummins diesel engines.

AUXILIARY EQUIPMENT

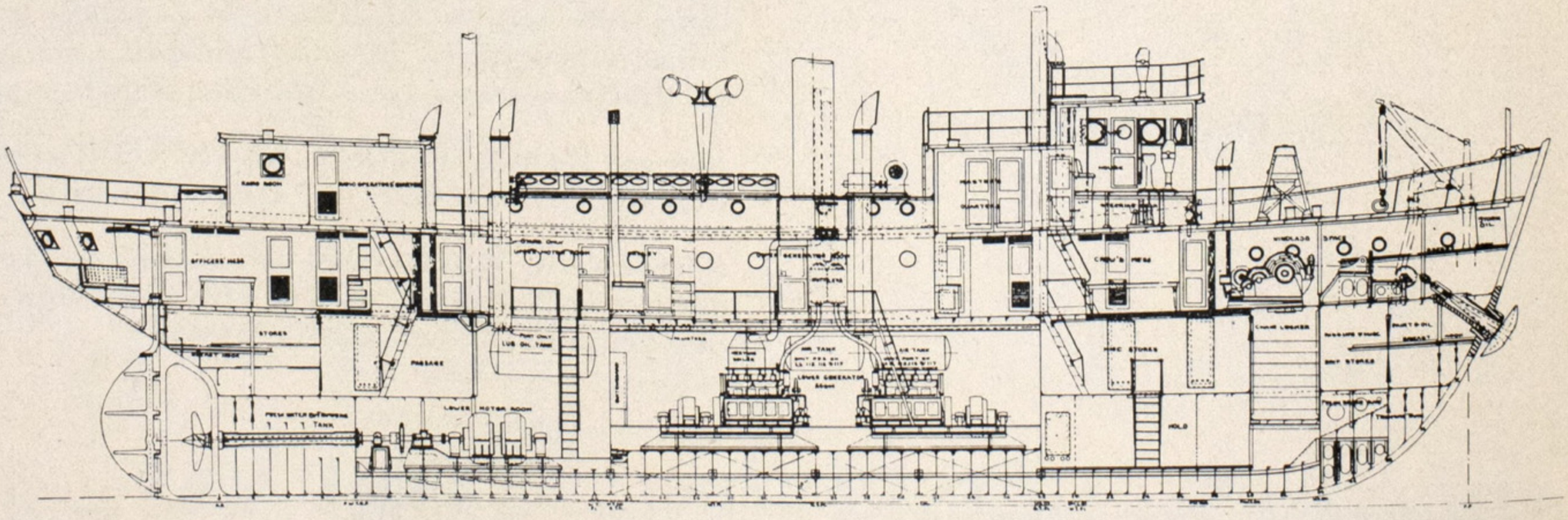
Manufacturers of:
Pumps—Worthington Pump & Mach. Corp.
Windlass—Hyde Windlass Co.
Winches—Hyde Windlass Co., Electro Dynamic electric motor
Steering Engine—Hand with Hyde unit
Propellers—Charleston Dry Dock & Mach. Co.
Oil Burning Equipment—Ray
Refrigeration—Frigidaire
Stern Bearing—Goodrich, Cutless type
Telegraphs—Chas. Cory Corp.
Marine Hardware—The Dayton Mfg. Co.
Electric Air Oscillator—Submarine Signal Co.

The rigging is of schooner type with two masts, each surmounted by lighthouse service standard lanterns. There is one oil burning donkey boiler used for heating the vessel. The single screw is driven by an electric motor, developing about 250 shaft horsepower.

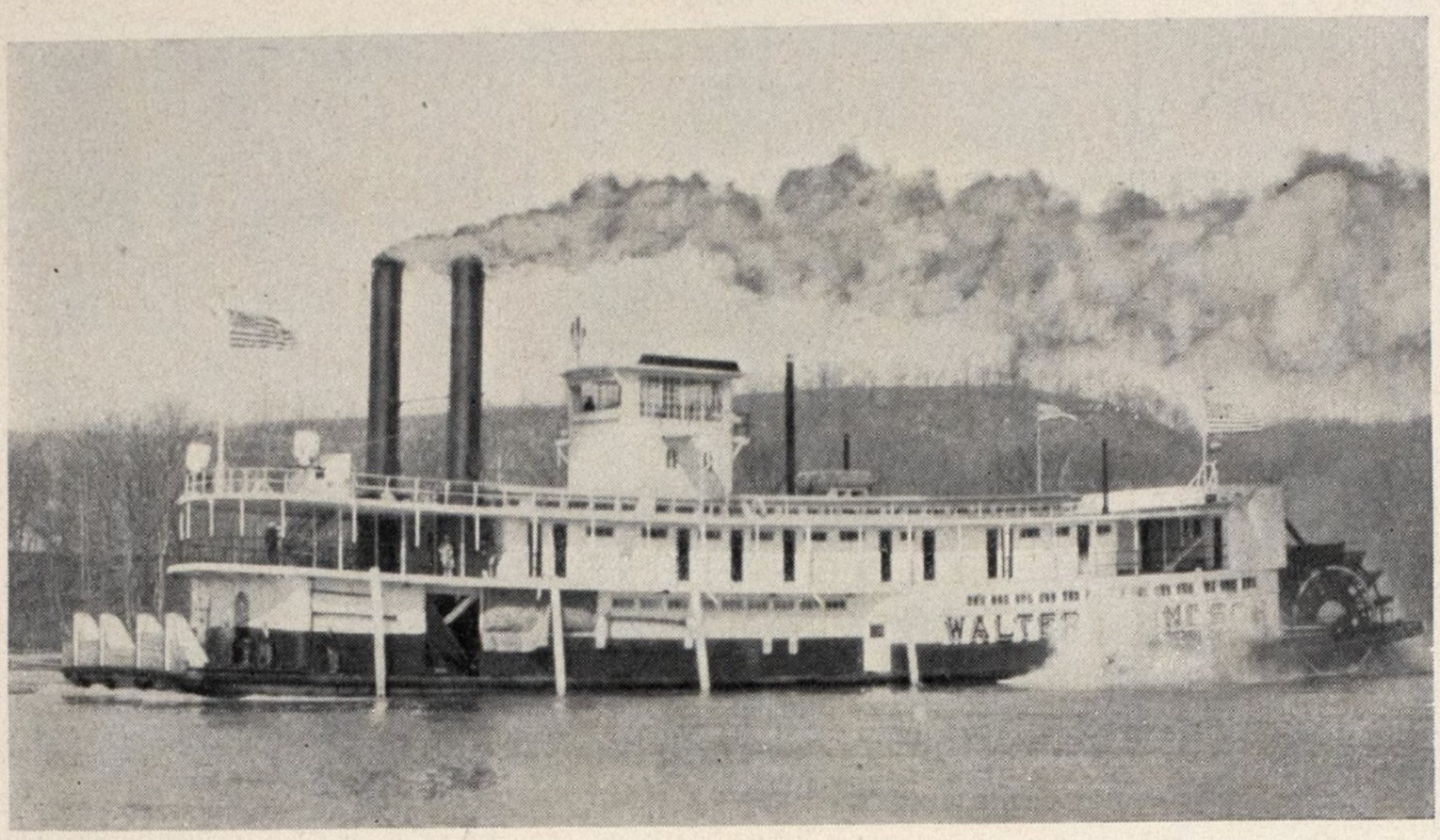
In going to diesel electric propulsion, it was anticipated that the electric motors would deteriorate less quickly and would require less attention than steam engines when idle over long periods of time. The electric equipment, taking everything into account, weighs less than steam equipment and is more economical.

DESCRIPTION

There are six lightships in this category built by two different yards. They are all steel vessels and retain in general the outward appearances of previous lightships. The machinery, however, is entirely different, being diesel electric. These new vessels are not only efficient from a mechanical point of view, but are also excellent sea boats.



WALTER A. WINDSOR—River Towboat—Stern Wheel—Steam



Name—WALTER A WINDSOR
Owner—Burnside Barge Line
Builder—Marietta Mfg. Co.
Naval Architect—Marietta Mfg. Co.
Launched—Dec. 1929; completed, March 1930
Classification—Owner's requirements

HULL PARTICULARS

Length over all, 190 feet; length between perpendiculars, 165 feet; breadth molded, 36 feet; depth molded, 6 feet 6 inches; draft, 5 feet; gross tonnage, 495; net tonnage, 495; bunker fuel capacity, in tons of coal, 120.

MACHINERY PARTICULARS

Main Engines—Two tandem compound condensing steam engines built by Marietta Mfg. Co. Size, 16 x 32 inches x 96 inches stroke; indicated horsepower, 1000 at 19 revolutions per minute of the stern wheel. The stern wheel is 22 feet 4 inches in diameter by 24 feet wide; 16 buckets 36 inches wide.

Boilers—Five, Western river fire tube boilers, built by Marietta Mfg Co. Size, 42 inches in diameter by 28 feet long. Fuel, coal.

Electric Generators—Engberg reciprocating engine driven built by Troy Engine & Mach. Co.

AUXILIARY EQUIPMENT

Pumps—Worthington Pump & Mach. Corp.
Capstans—Marietta Mfg. Co.
Steering Engine—Marietta Mfg. Co.
Refrigeration—Arctic

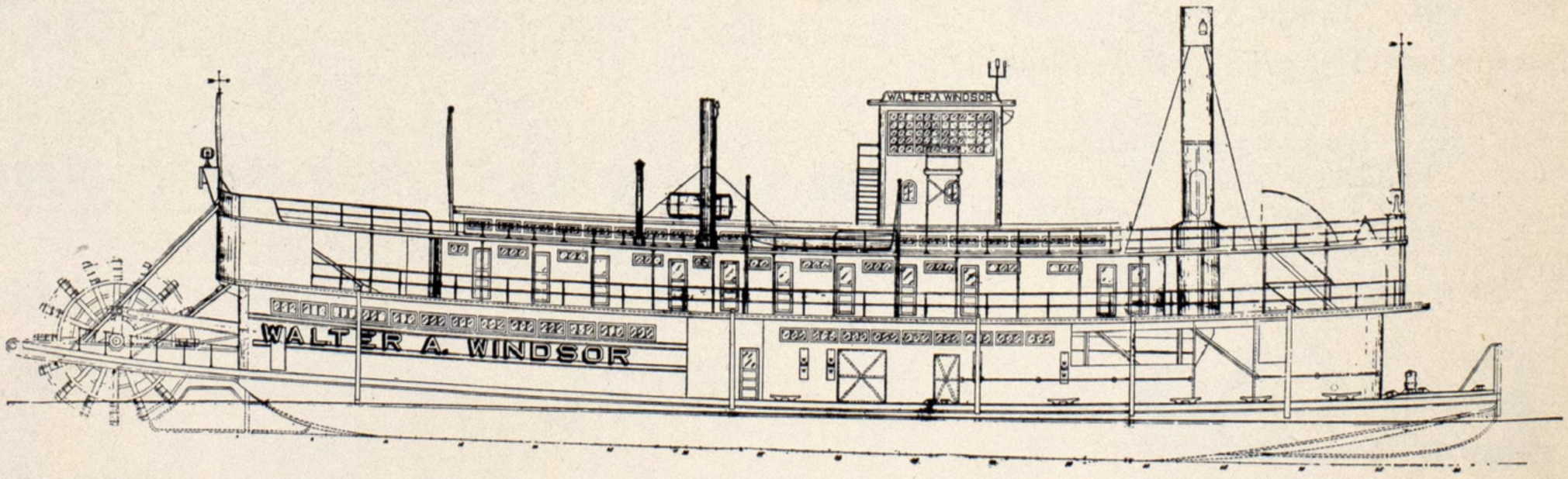
DESCRIPTION

This stern wheel towboat, though of more or less conventional Western river design is in many respects modern and is proving efficient in service, handling a large tow in the through trade from Pittsburgh to St. Louis, Memphis and New Orleans. The power plant is designed with special emphasis on economy. The hull is of steel throughout.

REMARKS

This vessel in design incorporates the practical experience of a life-time of river operation by the owner and of many year's experience in river towboat building by the shipyard. Nothing radical has been attempted. The engines are of the long stroke, horizontal type, each direct connected to the stern wheel cranks by pitmans. Though the boilers are also of the large diameter long flue Western river type, a good deal of attention has been given to saving the fuel by careful insulation of all exposed steam pipes and by the use of an efficient condenser and good feed water heating. Care has also been taken to protect the boiler from impurities in the water supply by the installation of filters and grease extractors. The boilers, five in number are located parallel, well toward the forward end of the vessel with the furnaces facing forward. Immediately forward of the boiler room is a good capacity coal bunker. On the forward end are located two powerful capstans.

Cabin arrangements for the officers and crew are located on the boiler deck and are very well laid out, giving excellent quarters. A large room with bath adjoining has been arranged for the captain and for the owner respectively, on the port and starboard side at the forward end of the quarters. Aft of these two spaces are two spare rooms.



Merchant Steel Vessels Over 100 Tons Under Construction in American Shipyards During 1930

Vessels Completed, Alphabetically Arranged

Vessel	Yard	Type	Class	Gross	Owners	Mach.	H.P.	Len. ft. in.	Beam ft. in.	Dep. ft. in.	Fuel	Remarks	Status
American	Canulette S. B. Co.	T. Boat	Rivers	326		Recip.	700	...	...	...	Coal	River Towing	Completed
Amherst	Fore River, Beth. S. B. Co.	Trawler	Ocean	167	General Sea Foods Corp.	Oil Eng.	375	110	22	11 6	Oil	Off Shore Fishing	Completed
Argus	Spedden Shipbuilding Co.	Patrol	Harbor	248	War Department	Recip.	550	121 5½	24	13 3	Oil	Supervisor N. Y. Harbor	Completed
Brilliant	Sun S. B. & D. D. Co.	Tanker	Ocean	9078	Standard Transp. Co.	Oil Eng.	3000	498	65 9	37	Oil	Oil Tanker—Ocean Service	Completed
Buckeye State	St. Lawrence Mar. Repair Co.	Cargo	Canal	1605	Federal Motorship Corp.	Oil Eng.	720	255	43 6	18	Oil	2000 tons Capacity	Completed
Carolinian	Charleston D.D. & Mach. Co.	Tanker	Harbor	226	M. L. Clark	Oil Eng.	180	120	23	10	Oil	Welded Construction	Completed
Chelsea	Todd Shipyards	Ferry	Harbor	239	City of New York	Oil Elec.	300	101 6	30	11 11½	Oil	Passenger and Vehicle	Completed
Chester Sun	Sun S. B. & D. D. Co.	Tanker	Ocean	9085	Motor Tankship Corp.	Oil Eng.	3000	498	65 9	37	Oil	Oil Tanker—Ocean Service	Completed
City of Flint 32	Manitowoc S. B. Corp.	Carferry	Lakes	3327	Pere Marquette Railway	Turb. Elec.	7200	381 6	57	22 6	Coal	Twin Screw Single Ended	Completed
City of Hampton	Maryland Dry Dock Co.	Ferry	Harbor	441	Norfolk Ferry Co.	Oil Eng.	600	157	41	11 6	Oil	Passenger & Auto Ferry	Completed
City of New York	Sun S. B. & D. D. Co.	P. Car.	Ocean	8272	Amer. South African Line, Inc.	Oil Eng.	5400	470 8	61 6	37	Oil	Twin Screw Cargo & Pass.	Completed
City of Norfolk	Hampton Roads S. B. Co.	Ferry	Harbor	597	Norfolk County Ferries Co.	Oil Elec.	650	173	57	14	Oil	Norfolk-Portsmouth Ferry	Completed
Cleveland	Pusey & Jones Corp.	T. Boat	Harbor	234	Erie Railroad	Oil Elec.	1000	108	26 1¾	13 9	Oil	Harbor Towing	Completed
Comet	Sun S. B. & D. D. Co.	Tanker	Ocean	9153	Standard Transp. Co.	Recip.	3600	498	65 9	37	Oil	Oil Tanker—Ocean Service	Completed
Cornell	Fore River, Beth. S. B. Co.	Trawler	Ocean	167	General Sea Foods Corp.	Oil Eng.	375	110	22	11 6	Oil	Off Shore Fishing	Completed
Dartmouth	Fore River, Beth. S. B. Co.	Trawler	Ocean	167	General Sea Foods Corp.	Oil Eng.	375	110	22	11 6	Oil	Off Shore Fishing	Completed
De Voe & Harold	United Dry Docks, Inc.	T. Boat	Harbors	284	Balt. & Ohio Railroad	Recip.	900	118 6	25	13 6	Coal	Shifting & Towing Boats	Completed
Dorothy Barrett	Canulette S. B. Co.	T. Boat	Rivers	180	American Barge Line Inc.	Recip.	700	142	32	5 10	Coal	River Towing	Completed
Du Bois II	United Dry Docks, Inc.	Tug	Ocean	301	Henry Du Bois Sons Co.	Recip.	950	128	27	14	Oil	General Towing	Completed
Eastern Sun	Sun S. B. & D. D. Co.	Tanker	Ocean	9089	Motor Tankship Corp.	Oil Eng.	3000	498	65 9	37	Oil	Bulk Oil Carrier—Ocean	Completed
Edward G. Seubert	Manitowoc S. B. Corp.	Tanker	Lakes	4432	Standard Oil Co., (Ind.)	Recip.	2400	400 7	53 3	27	Oil	Tanker—Great Lakes	Completed
Eugene P. Thomas	Great Lakes Eng. Works	Cargo	Lakes	7869	Pittsburgh Steamship Co.	Recip.	2200	604	60	32	Coal	Bulk Freighter—Great Lakes	Completed
Excalibur	New York S. B. Co.	Pass.	Ocean	9359	Export Steamship Corp.	Turbine	8695	475 4	61 6	42 3	Oil	New York—Mediterranean	Completed
Fordham	Bath Iron Works	Fishing	Coast	256	Bay State Fish Co.	Oil Eng.	550	132 4	24	13	Oil	Ocean Trawler	Completed
G. B. Loring	Spedden Shipbuilding Co.	Tug	Harbor	300*	U. S. Public Health Ser.	Oil Eng.	330	90	20	..	Oil	Quarantine, Boston	Completed
G. Harrison Smith	Federal S. B. & D. D. Co.	Tanker	Ocean	11752	Standard Shipping Co.	Turbine	4000	544	74	40 6	Oil	Tanker Ocean Service	Completed
Indiana	Charles Ward Eng. Wks.	T. Boat	Rivers	1323	Miss. Valley Barge Line	Turb. Elec.	2000	200	40	10 6	Oil	River Towing	Completed
Ira S. Bushey	Ira S. Bushey & Sons, Inc.	Tanker	Harbor	241	United Pet. Trans. Co. Inc.	Oil Eng.	240	..	..	..	Oil	Tanker—Harbor	Completed
Irene W. Allen	Beth. S. B. Co. Sp. Pt.	Tanker	Harbor	982	Lake Tankers Corp.	Oil Eng.	600	209	38	14 6	Oil	Harbor and Coast	Completed
Itasca	General Engineering Co.	Cutter	Ocean	2000*	U. S. Coast Guard	Turb. Elec.	3220	250	42	26 10	Oil	Similar to Chelan	Completed
James W. Good	Dubuque Boat & Boiler Co.	T. Boat	Rivers	530	Inland Waterways Corp.	Recip.	1000	160	42	6	Oil	Upper Mississippi Div.	Completed
Joe Cook	Nashville Bridge	T. Boat	Rivers	163	Pittsburgh	Recip.	180	..	..	..	Coal	Towing Rivers	Completed
Justine C. Allen	Beth. S. B. Co. Sp. Pt.	Tanker	Harbor	982	Lake Tankers Corp.	Oil Eng.	600	209	38	14 6	Oil	Harbor & Coast	Completed
K. Whittelsey	Spedden Shipbuilding Co.	T. Boat	Harbor	185	Oil Transfer Corp.	Oil Eng.	800	95	22	14	Oil	Coastwise Towing	Completed
Lightship No. 113	Albina Marine Iron Wks.	L. Ship	Coast	675*	U. S. Bureau Lighthouses	Oil Elec.	350	133 3	30	15	Oil	Four Generating Sets	Completed
Lightship No. 114	Albina Marine Iron Wks.	L. Ship	Coast	675*	U. S. Bureau Lighthouses	Oil Elec.	350	133 3	30	15	Oil	Four Generating Sets	Completed
Lightship No. 115	Charleston D. D. & M. Co.	L. Ship	Coast	630*	U. S. Bureau Lighthouses	Oil Elec.	350	133 3	30	15	Oil	Four Generating Sets	Completed
Lightship No. 116	Charleston D. D. & M. Co.	L. Ship	Coast	675*	U. S. Bureau Lighthouses	Oil Elec.	350	133 3	30	15	Oil	Four Generating Sets	Completed
Lightship No. 117	Charleston D. D. & M. Co.	L. Ship	Coast	675*	U. S. Bureau Lighthouses	Oil Elec.	350	133 3	30	15	Oil	Four Generating Sets	Completed
Liston	Charleston D. D. & M. Co.	Survey	Harbor	330	U. S. Engineers (Phila.)	Oil Elec.	450	105 4	22	10 6	Oil	Harbor Survey Work	Completed

Louisiana	Charles Ward Eng. Wks.	T. Boat	Rivers	1323	Miss. Valley Barge Line	Turb. Elec.	2000	200	40	10 6	Oil	River Towing	Completed
L. T. C. No. 1	Fore River, Beth. S. B. Co.	Tanker	Sound	548	Lake Tankers Corp.	Oil Elec	500	201 7	32	11 6	Oil	Tanker—Barge Canal	Completed
L. T. C. No. 2	Fore River, Beth. S. B. Co.	Tanker	Sound	548	Lake Tankers Corp.	Oil Elec.	500	201 7	32	11 6	Oil	Tanker—Barge Canal	Completed
L. T. C. No. 3	Fore River, Beth. S. B. Co.	Tanker	Sound	548	Lake Tankers Corp.	Oil Elec.	500	201 7	32	11 6	Oil	Tanker—Barge Canal	Completed
L. T. C. No. 4	Sp. Pt., Beth. S. B. Co.	Tanker	Harbor	435	Lake Tankers Corp.	Recip.	400	160	35	10	Oil	Tanker—Harbor	Completed
Morro Castle	Newport News S. B. Co.	Pass.	Ocean	11520	Atlantic, Gulf & W. I. Co.	Turb. Elec.	16000	508	70 9	39	Oil	Twin Screw, 20 kts.	Completed
N. Y. C. No. 35	United Dry Docks	Lighter	Harbor	532	New York Central	Oil Eng.	600	122	32 6	14 6	Oil	Harbor Lighterage	Completed
Ohio	Dravo Contracting Co.	T. Boat	Rivers	1323	Mississippi Val. Barge Line	Recip.	2140	200	40	10 6	Oil	River Towing	Completed
Olean	Pusey & Jones	T. Boat	Harbor	234	Erie Railroad	Oil Elec.	1000	108	26 1¾	13 9	Oil	Harbor Towing	Completed
Oriente	Newport News S. B. Co.	Pass.	Ocean	11520	Atlantic, Gulf & W. I. Co.	Turb. Elec.	16000	508	70 9	39	Oil	Twin Screw, 20 kts.	Completed
Pacific Sun	Sun S. B & D. D. Co.	Tanker	Ocean	9089	Motor Tankship Corp.	Oil Eng.	3000	498	65 9	37	Oil	Bulk Oil Carrier—Ocean	Completed
Passaic Sun	Sun S. B. & D. D. Co.	Tanker	Harbor	533	Sun Oil Co., Inc.	Oil Eng.	300	188 6	31	11 6	Oil	Short Coastwise	Completed
Patrick J. Hurley	Dubuque Boat & Boiler Co.	T. Boat	Rivers	530	Inland Waterways Corp.	Recip.	1000	160	42	6	Oil	Upper Mississippi Div.	Completed
Purol Pep	Beaumont Tex.	Tanker	Harbors	380		Oil Eng.	400	..	..	..	Oil	Harbor Coast	Completed
Raritan Sun	Sun S. B. & D. D. Co.	Tanker	Harbor	533	Sun Oil Co. Inc.	Oil Eng.	300	188 6	31	11 6	Oil	Short Coastwise	Completed
Robert J. Stewart	Leavenworth	T. Boat	Rivers	184		Recip.	407	..	..	..	Coal	Sternwheel river towing	Completed
Rochester	Pusey & Jones	T. Boat	Harbor	234	Erie Railroad	Oil Elec.	1000	108	26 1¾	13 9	Oil	Harbor Towing	Completed
Santa Clara	New York S. B. Co.	Pass.	Ocean	9373	Grace Lines, Inc	Turb. Elec.	13040	505	63 9	37 5	Oil	Twin Screw Pass. & Cargo	Completed
Saranac	General Engineering Co.	Cutter	Ocean	2000*	U. S. Coast Guard	Turb. Elec.	3220	250	42	26 10	Oil	Similar to Chelan	Completed
Scranton	Pusey & Jones	T. Boat	Harbor	234	Erie Railroad	Oil Elec.	1000	108	26 1¾	13 9	Oil	Harbor Towing	Completed
Sebago	General Engineering Co.	Cutter	Ocean	2000*	U. S. Coast Guard	Turb. Elec.	3220	250	42	26 10	Oil	Similar to Chelan	Completed
Shoshone	General Engineering Co.	Cutter	Ocean	2000*	U. S. Coast Guard	Turb. Elec.	3220	250	42	26 10	Oil	Similar to Chelan	Completed
Tennessee	Marietta Mfg. Co.	T. Boat	Rivers	270	U. S. Engineers	Oil Elec.	300	161	29	4 6	Oil	River Towing	Completed
Tennessee	Dravo Contracting Co.	T. Boat	Rivers	1323	Mississippi Val. Barge Line	Recip.	2140	200	40	10 6	Oil	River Towing	Completed
Texas	Marietta Mfg. Co.	Dredge	Rivers	450	McWilliams Dredging Co	Recip.	500	136	54 6	9	Oil	Dredging Miss. River	Completed
Thomas W. Lamont	Toledo Shipbldg. Co.	Cargo	Lakes	7964	Pittsburgh Steamship Co	Recip.	2500	604	60	32	Coal	Bulk Freighter—Great Lakes	Completed
Tidewater	Sun S. B. & D. D. Co.	Tanker	Ocean	8777	Tidewater Oil Co.	Oil Eng.	3000	498	65 9	37	Oil	Oil Tanker—Ocean Service	Completed
Tidewater Associated	Sun S. B. & D. D. Co.	Tanker	Ocean	8777	Tidewater Oil Co.	Oil Eng.	3000	498	65 9	37	Oil	Oil Tanker—Ocean Service	Completed
Titan	Howard Shipyards Co.	T. Boat	Rivers	429	Vesta Coal Co.	Recip.	1200	139 6	34	7 3	Coal	River Towing—Screw	Completed
T. C. Conway	Federal S. B. Co.	Tanker	Harbor	480	United Pet. Trans. Co.	Oil Eng.	360	160	28	12	Oil	Self-Propelled Oil Barge	Completed
T. L. Durocher	American S. B. Co.	T. Boat	Lakes	319	T. L. Durocher Co.	Recip.	1130	125	28	16 6	Coal	Towing & Ice Breaking	Completed
Tompkinsville	United D. D. S. I. S. B. Plant	Ferry	Harbor	2045	City of New York	Recip.	4000	267	46	19 9	Oil	New York Harbor Service	Completed
Van Dyke IV	Kensington Shipyard	T. Boat	Harbor	135	Atlantic Refining Co.	Oil Elec.	425	98 4	21	11 6	Oil	Harbor Service	Completed
Veedol No. 2	Pusey & Jones	Tanker	Coast	1818	Tidewater Oil Co.	Oil Elec.	1000	266 6	44	18 6	Oil	Single Screw—Bulk Oil	Completed
Violet	Manitowoc S. B. Corp.	Tender	Ocean	770*	U. S. Bureau Lighthouses	Recip.	1000	170	32	13	Oil	Twin Screw Lighthouse Tender	Completed
Virginia Sinclair	Fore River, Beth. S. B. Co.	Tanker	Ocean	6151	Sinclair Navigation Co.	Turbine	4000	435	57	32	Oil	Oil Tanker—Ocean Service	Completed
Walter A. Windsor	Marietta Mfg. Co.	T. Boat	Rivers	495	Burnside Barge Line	Recip.	1100	190	36	6 6	Coal	River Towing	Completed
Welfare	John W. Sullivan	Pass.	Harbors	255	City of New York	Recip.	600	106	26	12 7	Oil	Pass. Harbor	Completed
Western Sun	Sun S. B. & D. D. Co.	Tanker	Ocean	9089	Motor Tankship Corp.	Oil Eng.	3000	498	65 9	37	Oil	Oil Tanker—Ocean Service	Completed
W. H. Klein	Howard Shipyards Co.	T. Boat	Rivers	146	Dixie Sand & Gravel Co.	Recip.	600	123	28 6	5 2	Coal	River Towing—Stern Wheel	Completed
William Dickinson	Marietta Mfg. Co.	T. Boat	River	181	Marquette Cement Co.	Oil Eng.	700	124	26	7	Oil	Tunnel Screw Type	Completed
William J. Dickey	United Dry Docks, Inc.	Tugboat	Harbors	284	Balt. & Ohio Railroad	Recip.	900	118 6	25	13 6	Coal	Shifting & Towing Floats	Completed
Wm. Larimer Jones	Howard Shipyards Co.	T. Boat	Rivers	429	Vesta Coal Co.	Oil Eng.	1200	139 6	34	7 3	Coal	River Towing—Screw	Completed
Windsor	Toledo Shipbldg. Co.	Carferry	Lakes	3131	Wabash Railway	Recip.	5200	370 5	65	21 6	Coal	Detroit River Carferry	Completed
W. S. Farish	Federal S. B. & D. D. Co.	Tanker	Ocean	11752	Standard Shipping Co.	Turbine	4000	544	74	40 6	Oil	Tanker Ocean Service	Completed

Note * Displacement instead of gross tonnage.

(*Continued on Page 66*)

Merchant Steel Vessels Over 100 Tons Under Construction in American Shipyards During 1930

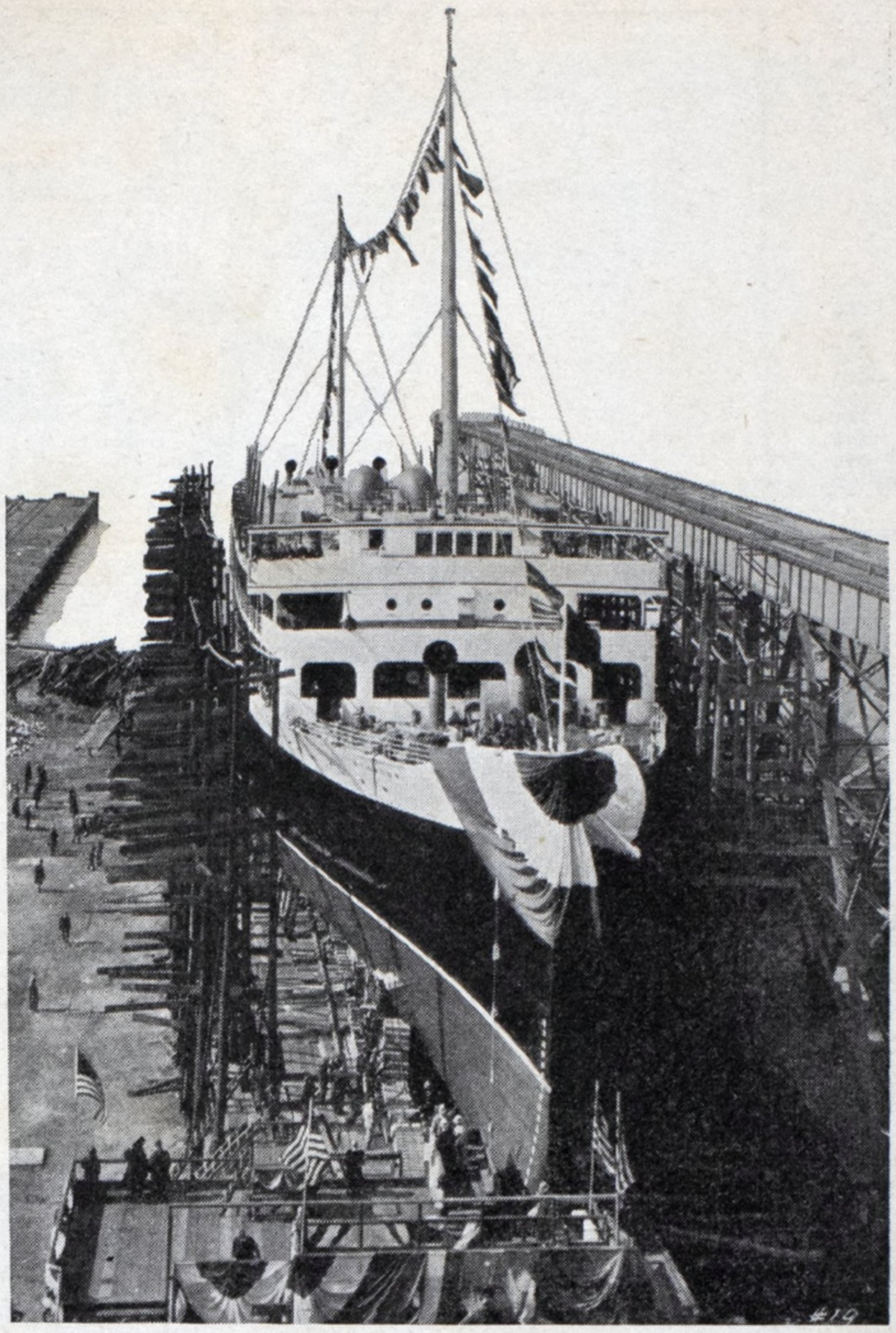
Vessels Under Construction as of December 31, 1930, Alphabetically Arranged

(Continued from Page 65)

Vessel	Yard	Type	Class	Gross	Owners	Mach.	H.P.	Len. ft. in.	Beam ft. in.	Dep. ft. in.	Fuel	Remarks	Status
Borinquen	Fore River, Beth. S. B. Co.	Pass.	Ocean	7114	Coamo Steamship Co.	Turbine	6400	429	59 6	35	Oil	N. Y.-Porto Rico San Domingo	Under Con.
City of Milwaukee	Manitowoc S. B. Corp.	Carferry	Lakes	2942	Grand Trunk Ry. Co.	Recip.	2700	360	56	21 6	Coal	Twin Screw Single Ended	Launch. 11/25 '30
Daylight	Sun S. B. & D. D. Co.	Tanker	Ocean	9131	Standard Trans. Co.	Oil Eng.	3000	498	65 9	37	Oil	Oil Tanker—Ocean Service	Under con.
Excambion	New York S. B. Co.	Pass.	Ocean	9360	Export Steamship Corp.	Turbine	8695	475 4	61 6	42 3	Oil	New York—Mediterranean	Under con.
Exeter	New York S. B. Co.	Pass.	Ocean	9360	Export Steamship Corp.	Turbine	8695	475 4	61 6	42 3	Oil	New York—Mediterranean	Under con.
Exochorda	New York S. B. Co.	Pass.	Ocean	9359	Export Steamship Corp.	Turbine	8695	475 4	61 6	42 3	Oil	New York—Medit.	Launch. 10/18 '30
Florida	Newport News S. B. Co.	Pass.	Ocean	5000	Peninsuiar & O. S. S. Co.	Turbine	9350	386 6	56 6	28 6	Oil	Caribbean Service	Keel Laid
General Sumner	Fore River, Beth. S. B. Co.	Ferry	Harbor	779	City of Boston	Recip.	1100	174 4	40 6	16 10	Coal	Boston Harbor	Launched
Harry F. Sinclair, Jr.	Fore River, Beth. S. B. Co.	Tanker	Ocean	6151	Sinclair Navigation Co.	Turbine	4000	435	57	32	Oil	Oil Tank.—Ocean Ser.	Delivered Feb. 1931
Henry A. Laughlin	Chas. Ward Eng. Wks.	T. Boat	Rivers	416	Vesta Coal Co.	Recip.	700	160	29 6	8 9	Coal	River Towing	Under con.
Herbert Hoover	Dubuque Boat & B. Co.	T. Boat	Rivers	1540	Inland Waterways Corp.	Oil Eng.	2200	215	43 6	10	Oil	Twin Screw Partial Tunnel	Under con.
Hull No. 8	Electric Boat Co.	Tug	Harbor	140	Electric Boat Co.	Oil Eng.	500	89 8	21 6	11 3	Oil	General Towing	Under con.
Hull No. 132	Sun S. B. & D. D. Co.	Tanker	Ocean	9000	Motor Tankship Corp.	Oil Eng.	3000	498	65 9	37	Oil	Oil Tanker—Ocean Service	Under con.
Hull No. 133	Sun S. B. & D. D. Co.	Tanker	Ocean	9000	Motor Tankship Corp.	Oil Eng.	3000	498	65 9	37	Oil	Oil Tanker—Ocean Service	Under con.
Hull No. 138	Sun S. B. & D. D. Co.	Tanker	Harbor	550	Atlantic Refining Co.	Oil Elec.	450	201 2	34	12	Oil	All welded hull	Under con.
Hull No. 344	Newport News S. B. Co.	Pass.	Ocean	7500	United Fruit Co.	Turb. Elec.	10500	446 9	60	34 9	Oil	Pass. & Freight	Contract Placed
Hull No. 345	Newport News S. B. Co.	Pass.	Ocean	7500	United Fruit Co.	Turb. Elec.	10500	446 9	60	34 9	Oil	Pass. & Freight	Contract Placed
Hull No. 346	Newport News S. B. Co.	Pass.	Ocean	7500	United Fruit Co.	Turb. Elec.	10500	446 9	60	34 9	Oil	Pass. & Freight	Contract Placed
Hull No. 405	New York S. B. Co.	Pass.	Ocean	30000	U. S. Lines, Inc.	Turb.	35870	705	86	47	Oil	Transatlantic	Under con.
Hull No. 406	New York S. B. Co.	Pass.	Ocean	30000	U. S. Lines, Inc.	Turb.	35870	705	86	47	Oil	Transatlantic	Under con.
Hull No. 797	United D. D. S. I. S. B. Plant	Cutter	Ocean	2000*	U. S. Coast Guard	Turb. Elec.	3220	250	42	26 10	Oil	Coast Guard Service	Under con.
Hull No. 798	United D. D. S. I. S. B. Plant	Ferry	Harbor	2000	City of New York	Recip.	4000	267	46	19 9	Oil	New York Harbor Service	Under con.
Hull No. 1049	Pusey & Jones	Tug	Bay	220	Donaldson Tow. & L. Co.	Recip.	550	105	23	15 2	Oil	General Towing	Under con.
Hull No. 1050	Pusey & Jones	Tug	Bay	220	Donaldson Tow. & L. Co.	Recip.	550	105	23	15 2	Oil	General Towing	Under con.
Hull No. 1051	Pusey & Jones	Tug	Harbor	225	Chesapeake & O. R. R. Co.	Recip.	800	109	28	14 6	Coal	Harbor Towing	Under con.
Hull No. 1058	Lawley & Sons Corp.	Fire Bt.	Harbor	250	City of Boston	Recip.	650	125	28	10	Coal	Harbor Service	Under con.
Hull 1444	Fore River, Beth. S. B. Co.	Pass.	Ocean	7500	United Mail S. S. Co.	Turb. Elec.	10500	447 9	60	34 9	Oil	Pass. & Fruit., S. Amer.	Contract Placed
Hull No. 1445	Fore River, Beth. S. B. Co.	Pass.	Ocean	7500	United Mail S. S. Co.	Turb. Elec.	10500	447 9	60	34 9	Oil	Pass. & Fruit, S. Amer.	Contract Placed
Hull No. 1446	Fore River, Beth. S. B. Co.	Pass.	Ocean	7500	United Mail S. S. Co.	Turb. Elec.	10500	447 9	60	34 9	Oil	Pass. & Fruit, S. Amer.	Contract Placed
Hull No. 4280	Beth. S. B. Co., Sp. Pt.	Tanker	Bay	930	Gulf Refining Co.	Oil Eng.	325	212	37	13 9	Oil	Harbor, Bay & River	Launched
Hull No. 4281	Sp. Pt., Beth. S. B. Co.	Tanker	Bay	930	Gulf Refining Co.	Oil Eng.	325	212	37	13 9	Oil	Harbor, Bay & River	Launch. 12/17 '30
Hull No. 5349	Beth. S. B. Co. Union Plant	Tug	Harbor	340	Young Bros. Ltd.	Oil Eng.	1500	129	28	15	Oil	For Hawaiian Islands	Under con.
Illinois	Bath Iron Works	Trawler	Ocean	255	Red Diamond Trawler Co.	Oil Eng.	550	132 4	24	13	Oil	Ocean Trawling	Under con.
Linden	Merrill Stevens D. D. Co.	Tender	Rivers	340*	U. S. Bureau Lighthouses	Oil Elec.	240	121 4	25	9	Oil	Light Station Maintenance	Under con.
Lurline	Fore River, Beth. S. B. Co.	Pass.	Ocean	18500	Matson Oceanic S. S. Co.	Turbine	22000	631 6	79	52 9	Oil	Twin Screw, 20½ kts.	Contract Placed
Maine	Bath Iron Works	Trawler	Ocean	255	Red Diamond Trawler Co.	Oil Eng.	550	132 4	24	13	Oil	Ocean Trawling	Under con.
Mariposa	Fore River, Beth. S. B. Co.	Pass.	Ocean	18500	Matson-Oceanic S. S. Co.	Turbine	22000	631 6	79	52 9	Oil	Twin Screw, 20½ kts.	Under con.
Monterey	Fore River, Beth. S. B. Co.	Pass.	Ocean	18500	Matson-Oceanic S. S. Co.	Turbine	22000	631 6	79	52 9	Oil	Twin Screw, 20½ kts.	Under con.
Northern Sun	Sun S. B. & D. D. Co.	Tanker	Ocean	8864	Motor Tankship Corp.	Oil Eng.	3000	498	65 9	37	Oil	Oil Tanker—Ocean Service	Under con.
President Coolidge	Newport News S. B. Co.	Pass.	Ocean	21900	Dollar Steamship Lines	Turb. Elec.	26500	654 3	81	52	Oil	Twin Screw—World Ser.	Launched 2/21/31
President Hoover	Newport News S. B. Co.	Pass.	Ocean	21900	Dollar Steamship Lines	Turb. Elec.	26500	654 3	81	52	Oil	Twin Screw—World Ser.	Launched 12/9/30
Red Star	Midland Barge Co.	Cargo	Coast	570	Victor Lynn Trans. Co.	Oil Eng.	560	155	31 11	12 6	Oil	Coasting Service	Under con.
Unknown	Nashville Bridge Co.	Dredge	Rivers	300	Central Sand & Gravel Co.	Oil Eng.	240	150	36	6	Oil	Mississippi River Service	Under con.
Unknown	Nashville Bridge Co.	Dredge	Rivers	200	McWilliams Dredging Co.	Oil Eng.	835	134 6	30	8	Oil	Mississippi River Service	Under con
Vesta	Chas. Ward Eng. Wks.	T. Boat	Rivers	416	Vesta Coal Co.	Recip.	700	160	29 6	8 9	Coal	River Towing	Under con.

Launch S. S. Florida at Newport News

New Passenger Vessel Building for Peninsular & Occidental S. S. Co.



On the launching platform. Miss Leiia Delano, sponsor, center; Mrs. Lyman Delano and Miss Elizabeth Lincoln Scaife, maids. Right—S.S. Florida, new passenger vessel building for Peninsular & Occidental S.S. Co., on the ways at Newport News, Va., where she was launched March 7

THE S. S. FLORIDA, building for the Peninsular and Occidental Steamship Co. was launched March 7 at the yard of the Newport News Shipbuilding & Dry Dock Co., Newport News, Va. The keel of the FLORIDA was laid Sept. 2, 1930. The general particulars are as follows:

Length over all .....387 ft. 8 in.
Length on water line .....378 ft.
Length between perpendiculars ....365 ft.
Beam, molded .....36 ft. 6 in.
Depth molded to promenade deck .....36 ft. 6 in.
Depth molded to upper deck....28 ft. 6 in.

The FLORIDA is a twin screw vessel of the complete super structure type with three decks to the hull proper, a continuous structure to the promenade deck which extends the full length of the vessel, and three tiers of super structure above. She has a slightly curved stem with a bulbous forefoot a semicruiser stern, is rigged with two steel pole masts and has one smoke stack. A complete double bottom and seven water tight or oil tight bulkheads are fitted which make the vessel comply fully with the subdivision requirements of the 1929 International Convention on the Safety of Life at Sea. Fire screen bulkheads in the super structure, airports throughout, and other applicable requirements of the convention are complied with. With the exception of two small houses on the boat deck, the erections are steel.

The 8500 shaft horsepower turbine propelling equipment will give the vessel a speed of about 20 knots. This machinery consists of two sets of cross compound geared turbines and four oil burning B. & W. boilers operating under forced draft with 250 pounds working pressure.

Accommodations will be provided for 612 first class passengers in 207 state rooms, and for 130 second class passengers in separate berthing spaces on the lower deck aft. First-class state rooms will be located on the main deck amidships and on the upper, promenade and saloon decks, and will include four deluxe rooms with private bath and 20 special rooms with private shower and toilet. All state rooms will have lavatories with running water. There will also be a number of public bathrooms. Public passenger spaces will include a large smoking room, a separate cabaret with a large dance floor on the saloon deck, and several lobbies. The main dining saloon with a seating capacity for 176 persons will be located aft on the main deck. A completely equipped modern galley will be located on the lower deck.

Special provision is being made to carry a large number of automobiles on the main deck forward and in No. 2 'tween decks and hold. A special elevator 18 feet by 9 feet 6 inches electrically operated is being fitted on the vessel to handle them. Similar elevators of a smaller size are being fitted forward and aft to handle freight which will be loaded and unloaded through cargo ports.

In the launching party were Miss Leila Delano, sponsor; Mrs. Lyman Delano and Miss Elizabeth Lincoln Scaife, maids; Mr. Lyman Delano, executive vice president of the Atlantic Coast line railroad; Mr. Wm. R. Kenan Jr., president, Florida East Coast Railway Co.

Launching Data

Inclination of keel per foot.....½ in.
Inclination of ground ways per foot.....$\frac{21}{32}$ in.
Transverse inclination of ground ways per foot.....⅜ in.
Distance between ribands:
  At forward knuckle.....23 ft. 9 in.
  At outer bulkhead.....24 ft.
  At outer end of ways.....24 ft. 2 in.
Width of ground ways:
  Inboard.....48 in. and 54 in.
  Outboard.....60 in.
Width of sliding ways.....36 in.
Width of packing.....36 in.
Effective length of sliding ways.....300 ft.
Effective area of sliding ways on grease, both sides.....1800 sq. ft.
Amount of water ballast, fresh water..185 long tons
Total estimated launching weight on grease.....4055 long tons
Estimated pressure per square foot on the grease.....2.25
Actual measured distance from bottom of rubbing keel at forward knuckle to top inside edge of ground ways.....3½ in.
Distance of ground way ends beyond outer bulkhead.....110 ft.
Expected minimum depth of water over outer ends of ground ways at average M. H. W.....8 ft., 6 in.
Estimated distance slid to pivoting.....427 ft.
Estimated pivoting load, long tons.....500
Estimated positive moment against tipping .....30,000 ft. tons
Estimated maximum way in pressure, long tons per square foot.....9.7
Estimated static drop at way ends.....2 ft. 5 in.
Probable actual drop at way ends.....5 ft.

Map Showing Most Important Inland Waterways of the United States

The unlimited possibilities for economical transportation offered by the great interlocking inland waterway system in the eastern half of the country can be visualized from this map. It is to be noted that this great natural transportation system serves the richest industrial section of the country. The more important waterways are shown by shaded lines, less important ones by solid black lines, and pro posed or semi-completed waterways by broken lines

Transportation on Inland Waterways

Improvement of Channels—Savings in Freight Resulting—Commerce Moving Over Rivers and Canals—Future Work—Proposed and Projected Waterways

Part I

BY E. C. POWERS

INLAND waterways are a vital aid in the industrial development of the United States. Economically there is every justification for a sound improvement of inland waterways. One has but to look at a map of the United States to realize the necessity. Economical interchange of raw materials and finished products depends on water transportation. Money spent on development of the more important waterways has been saved many times over in the very substantial reduction of freight rates which have come about through the creation of greater depths and the consequent operation of deeper draft vessels carrying larger cargoes.

Improvement of inland waterways should be looked upon as conservation of natural resources. Developing them is, in the last analysis, nothing more or less than taking fullest advantage of what has been given us by nature. It is just as though someone had said, "Here is a great system of transportation. All that need be done in order that you may use it is that it be improved and maintained." In other words, there it is—use it!

Approximately $53,000,000 were allotted March 12 by the secretary of war for work on rivers and harbors. The total allotments for this work are: $52,819,245.75 from the $60,000,000 provided in the war department appropriation act approved Feb. 23, 1931, and available balances of the act of May 28, 1930, and of the $22,500,000 emergency appropriation for relief of unemployment.

The following table gives some idea of the growth in the movement of freight over the inland waterways for ten years. This table shows an increase of over 96 per cent.

NET TONS OF COMMERCE ON RIVERS, CANALS AND CONNECTING CHANNELS—CALENDAR YEARS 1920-1929 INCLUSIVE

Year	TONS (2000 pounds)
1920	125,400,000
1921	116,300,000
1922	111,800,000
1923	153,700,000
1924	173,200,000
1925	204,569,000
1926	217,000,000
1927	219,000,000
1928	227,300,000
1929	245,894,000

The Mississippi-Ohio system has been referred to as the backbone of the program for inland waterway development in the United States. In 1928, the total ton-mileage of this huge transportation system amounted to 5,662,743,000 ton miles. This figure was 60.65 per cent of the total inland waterway traffic of that year. In 1929, total net tonnage for this system after eliminating all known duplications was 61,893,916 net tons valued at $770,253,321.

COMMERCE ON MISSISSIPPI-OHIO SYSTEM

Year	GROSS TONS REPORTED
1920	51,132,004
1921	44,350,986
1922	35,033,441
1923	52,779,088
1924	55,750,689
1925	67,531,478
1926	77,036,480
1927	75,674,305
1928	79,794,356
1929	78,117,545

Mississippi River

THE Mississippi river has its source in northern Minnesota. It flows south a distance of 2470 miles and empties into the Gulf of Mexico. Over the section of the Mississippi river between Baton Rouge and New Orleans, a channel depth of 24 feet or more with a width of several hundred feet has usually prevailed. The river and harbor act of Jan. 21, 1927 authorized improvement of this section to secure a channel 35 feet deep and 300 feet wide at low water between Baton Rouge and New Orleans, a distance of 132 miles. Improvement of this section has resulted in the continuous operation of deeper draft vessels. The portion of the river between the Ohio and Missouri has been improved to a channel depth of nine feet with a width of 300 feet and additional widths at bends to be eventually provided. Improvement has permitted operation of deeper draft boats and has reduced greatly the hazards of navigation.

Depths of the river between Cairo and New Orleans have always been greater than the nine-foot project so that the only work required has been for maintenance. The 1929-30 project for the section between the Illinois and Missouri rivers provided for securing a depth of nine feet and width of 200 feet. Deeper-draft vessels are now operating over this section as result of improvement.

In the original state, the section of the river between the Illinois and Wisconsin river was navigable, but at periods of low water, the operation of larger vessels was seriously hindered and in some cases entirely impossible. The improvement project underway during the last fiscal year has been to secure a channel with depth of six feet and varying width between the Wisconsin and Illinois rivers. Between the Wisconsin river and Minneapolis, navigation has been possible as far north as St. Paul but was seriously retarded at low water stages. Between Minneapolis and the Minnesota river, the current was swift and the channel obstructed by boulders. The improvement project underway for this section of the river during the last fiscal year was to provide a channel with a depth of six feet with widths varying between 300 and 700 feet. This improvement was being carried out by open channel work through dams and dredging. During the fiscal year ending June 30, 1930, work on the construction of Hastings lock and dam was carried on, the project at the end of the year being 81.9 per cent completed. In addition, considerable wing dam construction was done, besides regulating works and dredging. Total cost of work during the year was $6,626,457.34 of which $5,070,066.58 was for new work and $1,556,390.76 for maintenance.

In the 1930 rivers and harbors bill signed by President Hoover July 5, 1930, all projects between the mouth of the Missouri river and Minneapolis

WITH a total commerce in 1929 of 245,894,000 net tons and an increase in the last ten years of over 96 per cent, the inland waterways of the United States are of vital importance to the country as a whole. The accompanying article on the improvement of 15 important inland waterways is the first part of a comprehensive article covering the business of transportation by inland waterways. The second part which is to appear in the May number will cover development of river boats, present day types, particulars of lines and where they operate, and discussion of savings in freight rates. The third part, to appear in the June number, will deal with the subject of terminals and cargo handling facilities.

were modified to provide for a channel of nine-foot depth. For carrying out this work a sum not exceeding $15,000,000 was authorized and the recommendation was made that all permanent structures on the upper Mississippi to be built under existing projects be carried out with a view of being adapted without reconstruction or relocation to plans for an ultimate nine-foot depth.

On March 12, 1931, approximately $6,860,000 was alloted by the secretary of war of work on this river.

Commerce on the Mississippi river during recent years has been developing with rapid strides. Among the most important commodities moving by boat over this waterway are: Grain, coal and coke, iron and steel, petroleum products, bauxite, etc.

To give some idea of the growth in commerce over the Mississippi, statistics are given as follows for the section of river between Cairo, Ill., and Memphis, Tenn.:

COMMERCIAL STATISTICS—BETWEEN CAIRO-MEMPHIS

Year	Short Tons	Value	Passengers
1924	1,153,021	$87,404,116	109,987
1925	1,688,654	105,818,559	68,092
1926	1,660,188	95,261,086	106,393
1927	2,144,317	126,507,317	113,639
1928	2,531,256	136,714,907	55,077
1929	2,328,334	150,050,769	17,721

Ohio River

THE Ohio river is formed by conjunction of the Allegheny and Monongahela rivers at Pittsburgh and empties into the Mississippi river at Cairo, Ill. The Ohio drains one of the world's most highly developed industrial sections and has a total navigable length of 981 miles, with a depth of nine feet. Width varies from about 890 feet at a point about 105 miles below Pittsburgh to about 5910 feet at a point 946 miles below Pittsburgh. The cost of lock and dam construction when the Ohio river project was formally opened Oct. 19, 1929, was approximately $126,000,000. Cost of operation and maintenance of locks and dams has been estimated at $2,250,000 annually with cost of channel maintenance $500,000. During the fiscal year ending June 30, 1930, work was carried on at various locks and dams comprising a part of the system. Cost of this work during the year amounted to $2,683,084.83. In addition to this, the sum of $1,590,607.95 was spent on open channel work, consisting mainly of dredging and $2,181,261.38 for operation and care of completed locks and dams. A sum of $2,328,000 was alloted March 12 by the secretary of war for maintenance work on the Ohio river.

COMMERCIAL STATISTICS—OHIO RIVER

Year	Short Tons	Value	Passengers
1924	*10,866,682.91	$128,356,018.00	1,882,961
1925	*15,737,072.00	151,622,242.00	1,374,268
1926	*19,754,978.00	150,086,223.00	1,677,476
1927	*20,128,518.00	168,422,904.00	2,004,513
1928	*20,938,267.00	191,519,168.00	1,990,143
1929	*21,955,148.00	192,308,473.00	1,803,528

*Freight and passengers carried through locks and open river. Does not include ferry traffic across river.

Improvement of the Ohio river has resulted in a marked increase in tonnage during recent years.

Savings in river transportation compared with rail charges during recent years have served to substantially offset the actual investment in river improvement. It has been estimated that the annual net saving on the Ohio river system amounts to approximately $15,000,000.

Monongahela River

THE Monongahela river is the most important tributary of the Ohio river and each year millions of tons of steel products pass over its waters whence they enter the Ohio river, thence on to the Mississippi river and ultimately reach tidewater at the Gulf of Mexico. The Monongahela rises near Fairmount, W. Va., and joins the Allegheny river at Pittsburgh to form the Ohio.

Various improvements have been made and the existing project provides for further improvement by construction of 14 locks and dams to afford slack water navigation from Pittsburgh to four miles above Fairmount, W. Va. Cost of work during year ending June 30, 1930 was $126,680.83. Cost of maintenance of completed locks and dams was $856,540.25. The secretary of war on March 12 allotted $375,000 for work on the Monongahela river.

Improvement has made water transportation thoroughly dependable and has established a heavy traffic of about 26,000,000 tons annually. The river is navigable throughout the year except for a few days annually on account of high water and ice. Following is a comparison by years of the commerce:

COMMERCIAL STATISTICS—MONONGAHELA RIVER

Year	Short Tons	Value	Passengers
1924	21,878,815	$123,355,072	815,358
1925	23,716,121	121,322,310	1,818,625
1926	26,374,682	117,805,525	1,293,033
1927	25,873,029	135,760,330	1,165,117
1928	27,412,143	170,974,558	765,943
1929	28,907,614	166,121,576	592,130

Missouri River

THE Missouri river flows a distance of 2550 miles across or along seven states from north central Montana and empties into the Mississippi river 17 miles above St. Louis.

Work on the improvement of the Missouri between Kansas City and the mouth during fiscal year ending June 30, 1930 was carried on at a rate never before attained. The cost of work on this section amounted to $15,605,546.32 and between Kansas City and Sioux City $2,823,381.66. The project for a six-foot depth below Kansas City is about 70 per cent completed. From the opening of navigation early in March to the close of August, the ruling depth generally fluctuates between four and nine feet. During the low water season, a channel depth of not exceeding 3½ feet obtains in the unimproved sections. In the section between Kansas City and Sioux City there is not a dependable depth in excess of three feet during the period of low water nor of 3½ feet for any considerable length of time at any season.

For the reach of the river between Sioux City and Fort Benton, Mont., improvements have been rather too limited to be of very extensive benefit to navigation. Over this stretch, drafts of 22-30 inches are practicable from April to October. A sum of $7,059,800 was alloted March 12 by the secretary of war for work on the Missouri river.

COMMERCIAL STATISTICS—KANSAS CITY TO MOUTH

Year	Short Tons	Value
1924	247,324	$831,084
1925	410,899	730,778
1926	514,424	974,403
1927	551,280	1,207,405
1928	813,201	2,055,247
1929	1,158,332	5,255,638

Tennessee River

THE Tennessee river rises in eastern Tennessee and enters the Ohio river at Paducah, Ky., a distance of 652 miles.

Improvements have been going ahead on the 188-mile section between the head and Chattanooga to provide 6-foot navigation at extreme low water for 24.6 miles of the section and to secure throughout the remainder of the section by excavation and dredging a channel 150 feet wide and three feet deep at extreme low water. During the fiscal year ending June 30, 1930, work on projects in force prior to the one adopted by the 1930 river and harbor act was carried on, the cost amounting to $71,211.63 for new work and $178,741.42 for maintenance. Completed locks and dams were operated and maintained at a cost of $82,011.36. On March 12, the secretary of war allotted $360,000 for work on the Tennessee river.

COMMERCIAL STATISTICS
(Between Knoxville, Tenn. and Paducah, Ky.)

Year	Short Tons	Value	Passengers
1925	1,968,226	$13,708,351	28,081
1926	2,042,975	16,748,541	29,530
1927	2,291,519	18,922,423	31,115
1928	2,269,192	14,074,538	21,795
1929	2,185,540	15,058,526	5,308

In the recent river and harbor bill, permanent improvement of the main stream of the Tennessee river was authorized to secure a navigable depth of nine feet for the first 83 miles upstream from Paducah, Ky., total expenditures including surveys and investigations for low dams for navigation only for that portion of the river below Hales Bar dam not to exceed $3,500,000.

Cumberland River

THE Cumberland river rises in south central Kentucky and empties into the Ohio near Smithland, Ky.

The latest project for improvement

called for such work as necessary to secure a channel six feet deep at low water on the lower reaches and a four-foot channel on upper reaches of the 518.7 miles of river between the mouth and Burnside, Ky., the head of navigation. The only work done during the fiscal year ending June 30, 1930, was the operation and maintenance of the completed locks and dams at a cost of $177,925.15.

A comparative statement of traffic by years follows:

COMMERCIAL STATISTICS—CUMBERLAND RIVER

Year	Short Tons	Value	Passengers
1924	166,146	$1,489,616	10,094
1925	212,616	1,188,044	7,717
1926	270,592	1,881,218	5,801
1927	269,925	2,426,146	4,949
1928	230,932	2,018,351	4,872
1929	297,137	2,423,362	3,731

New York State Barge Canal

THE New York state canal system comprises four principle divisions known as the Cayuga-Seneca, Champlain, Erie and Oswego. Of these, the Erie division is the most important, both as to tonnage moved and as to length. The canal system embraces numerous lakes, reservoirs, feeders, harbor basins and terminals. From Troy, N. Y., the head of Hudson river navigation, the distance to Buffalo via the Erie division is 353 miles; from New York City to Troy, the Hudson river distance is 152 miles. The most recent improvement of the Erie canal was authorized in 1903. The canal was completed and the system open to navigation in 1918.

The channel is 75-100 feet wide at the bottom and 12 feet deep. Locks are 328 feet long by 45 feet wide. There are 56 electrically operated canal locks and one siphon lock. No boat over 300 feet long and 43½ feet wide is permitted to navigate the canals. No tolls or other fees are collected, but a nominal charge is made for the use of hoisting equipment at terminals.

A certain number of locks are unwatered and given a thorough overhauling each year. Under this program of periodic repairs. the locks are kept in first class condition.

There had been transported during the past season up to and including Oct. 4, 1930, a total of 2,739,469 net tons of bulk commodities or package freight usually handled in large lots, e.g. grains, petroleum products, iron and steel, paper, sugar, salt, lumber, sulphur, coal, clay, fertilizer, etc. Notwithstanding that the past year was one of general business depression, the above tonnage is an increase of 607,184 tons over the amount transported during the corresponding part of the season of 1929. It is also an increase of 403,904 tons over the corresponding part of the season of 1928, in which year more tonnage was moved than in any other one year since the canal's enlargement. In 1918 there were moved through canal channels 1,159,270 net tons; during the season of 1929 the tonnage reached 2,876,160 net tons or an average increase of about 13½ per cent.

Warrior River System

THE source of the Tombigbee river is in northeastern Mississippi whence it flows into the Alabama river to form the Mobile river, 45 miles above Mobile bay. The length is about 503 miles. The Black Warrior river rises in northern Alabama and flows into the Tombigbee. Length of this stream is about 362 miles. These three rivers make up what is known as the Warrior river system.

Under the project going ahead during fiscal years 1929-1930, construction was provided of 17 dams and 18 locks and for such dredging and clearing of channels by snagging as necessary to secure an all-year channel of six-foot depth at low-water from the mouth of the Tombigbee river to the junction of the two forks of the Black Warrior river, a distance of 362½ miles and 36 miles on the two forks of the Black Warrior river making a total distance of 414½ miles. During the year ending June 30, 1930, dredging and rock removal was carried on, the cost amounting to $39,530.21. In addition, the completed locks and dams were maintained and operated at a cost of $468,227.60. The entire project is 98 per cent completed, the project depth of six feet over a minimum width of 100 feet obtaining throughout the length of the improvement. Approximately $53,500 was allotted March 4 for work on this waterway. Improvement, where it has been carried out, has provided a freight rate for shipments by water and rail equivalent to 80 per cent of the rate for all-rail shipment. A record of commercial statistics follows:

COMMERCIAL STATISTICS

Year	Tons	Value	Passengers
1924	1,105,260	$16,263,186	2239
1925	1,383,712	20,785,437	5089
1926	1,292,098	22,863,319	2388
1927	1,467,315	28,726,579	1532
1928	1,758,358	29,908,668	455
1929	1,938,773	44,440,923	683

Hudson River

THE Hudson river rises in the Adirondack mountains and flows a distance of about 315 miles to New York bay. During the fiscal year ending June 30, 1930, operations were going forward on maintenance and in securing a channel 27 feet deep at mean low water, 400 feet wide through rock cuts and 300 feet wide elsewhere to Hudson from Albany, and thence a channel 12 feet deep at low water to Waterford, this channel to be secured by dredging and rock excavation. Cost of work during year was $1,859,984.33.

In the recent river and harbor bill, improvement of the Hudson was authorized to secure a channel of 27-foot depth and 300-foot width from New York City to Hudson at an estimated cost of $169,000 with $16,000 annually for maintenance.

For work on the Hudson river, a sum of $779,000 was alloted on March 12 by the secretary of war.

A comparison of commercial statistics between Hudson and Waterford by years follows:

COMMERCIAL STATISTICS

Year	Short Tons	Value	Passengers
1924	1,697,985	$111,209,587	2,137,585
1925	1,578,626	91,309,658	2,128,649
1926	1,345,655	95,818,606	1,545,014
1927	1,481,679	101,783,725	1,691,054
1928	1,471,679	101,274,331	1,877,571
1929	1,329,036	101,226,494	2,291,028

Columbia River

THE Columbia river rises in British Columbia and western Montana, flows southwesterly about 1200 miles through Washington and between Washington and Oregon and empties into the Pacific ocean 610 miles north of San Francisco bay. Before construction of the railroads, the Columbia river formed the main highway between the inland empire and tidewater, but navigation was practically suspended in 1882 upon completion of the railroad which parallels the south bank of the river.

Improvement at the mouth of the river has made it possible for the largest vessels operating on the Pacific coast to enter and leave at any stage of the tide and in any weather except during the most severe storms. Barbound vessels, once such a common sight, are now rarely seen on account of improved conditions. Improvement between the mouth and Portland, Ore., and Vancouver, Wash., has greatly increased the draft of vessels that can ascend to these two cities, and has enabled steamship lines to operate on regular schedules. Vessels now arrive and depart from Portland and seldom have to wait for tides.

Construction of The Dalles-Celilo canals has permitted river boats to operate on the Columbia for 540 miles from the mouth. Improvement of the upper reaches of the river to the mouth of the Snake river, Oregon and Washington, has made navigation much easier and safer and has increased the length of the low-water navigation season. During the fiscal year ending June 30, 1930, dredging was done on the Columbia and Lower Willamette rivers making channel depths of 31-35 feet at low water except in the channel to Vancouver, where a minimum depth of 26½ feet was obtained. Cost of work for the year was $284,285.17.

A sum of $811,500 was allotted March 12 by the secretary of war for work on the Columbia and Willamette rivers.

Commerce passing in and out of the Columbia river at the mouth is maintaining a steady rate of growth. Following is a comparison by years of

commerce handled by river vessels only between Vancouver and Portland:

COMMERCIAL STATISTICS

Year	Short Tons	Value	Passengers
1924	1,961,216	$43,289,666	112,516
1925	2,421,359	42,056,366	90,268
1926	2,345,923	41,776,935	87,351
1927	2,331,859	40,914,764	71,009
1928	2,013,775	45,236,888	68,655
1929	2,221,885	37,548,052	61,357

As result of improvement, there is a large saving in freight transportation costs on the commerce handled in ocean going vessels on the lower Columbia. Savings during 1928 on a total of 6,558,591 tons handled above Astoria are estimated at $16,000,000. On receipts of petroleum products alone (1,991,988 tons during 1928), there was an estimated saving of $3.10 per ton or a total of $6,175,163, based on the approximate cost of the rail haul as an alternative.

Sacramento and San Joaquin Rivers

THE Sacramento and San Joaquin rivers in California constitute an important waterway on the Pacific coast. The latest improvement project underway on this river during the fiscal year 1929 and 1930, was to provide a channel 10 feet deep at low water and 150 to 200 feet wide from the mouth to Sacramento; then 4 feet deep at low water to Colusa; then 3 feet deep at low water to Chico Landing; and such depths as practicable to Red Bluff. The total length of river under improvement is 248 miles. As result of the year's work, navigation was maintained without interruption between the mouth and Sacramento. From February to May, a draft of 8 feet is available as far as Colusa; 5 feet to Chico Landing; and 4 feet to Red Bluff. Work during the year consisted in dredging and construction of Wing dams. On March 12 $200,000 was allotted by the secretary of war for work on this river. A comparative statement of traffic follows:

COMMERCIAL STATISTICS

Sacramento River

Year	Short Tons	Value	Passengers
1924	1,796,105	$58,662,997	88,002
1925	1,427,230	80,500,145	83,679
1926	1,222,993	85,315,284	76,228
1927	1,209,870	78,616,610	78,201
1928	991,528	77,747,732	69,046
1929	1,128,768	74,088,210	61,206

The San Joaquin river rises in the central part of California and flows northwesterly. The latest improvement project, going ahead during the fiscal year 1929-1930 was to provide a channel 26 feet deep at mean low water and generally 100 feet wide at the bottom from the mouth to Stockton a distance of 45 miles. At the end of the fiscal year a channel from the mouth to Stockton with 9-foot depth and 200-foot width, was completed except for maintenance. Fifteen river bend cutoffs were made which shortened the navigable channel more than six miles. A sum of approximately $250,000 was allotted March 12 by the secretary of war for work on this waterway. Following is a comparative statement of traffic:

COMMERCIAL STATISTICS

San Joaquin River

Year	Short Tons	Value	Passengers
1924	727,499	$38,185,313	133,017
1925	849,687	47,192,499	131,520
1926	934,809	56,455,662	113,452
1927	1,152,743	51,604,962	99,320
1928	984,326	43,378,146	80,828
1929	941,139	42,759,858	77,993

Improvement of the channels of these two rivers has aided in the development of industries in the river valleys and has resulted in lowering of freight rates.

St. Lawrence Waterway Project

THE governments of the United States and Canada in 1920 referred to the International Joint commission, a body created by the treaty of June 11, 1909, certain questions relating to the improvement of the St. Lawrence river between Lake Ontario and Montreal for the purpose of making it navigable for deep draft vessels and securing the greatest beneficial use of the water for power.

Each of the governments designated an engineer to co-operate in the surveys necesary to plans for improvement and in the preparation of plans and estimates. These surveys, plans, and estimates were submitted to the International Joint commission in 1921. They provided for a navigation channel 25 feet deep, with lock sills 30 feet in depth, so built as to permit the eventual enlargement of the channel to the latter depth. The improvement was to be secured by the combined development for navigation and for power of the rapids section on the international boundary, with side canals around the other rapids sections in the river and the necessary channel excavation.

This report was made the subject of public hearings before the International Joint commission. At these hearings several alternative plans were presented for the consideration of the commission, especially with relation to the development of power in the international section. The commission recommended that the governments of the United States and Canada enter into an arrangement by way of treaty for a scheme of improvement of the St. Lawrence river between Montreal and Lake Ontario; but that before any final decision be reached, the engineering report be referred to an enlarged engineering board to the end that the whole question be given the further and complete study that its magnitude and importance demand. In accordance with this recommendation, the two governments appointed a joint engineering board in 1924 consisting of three engineers from the United States and three engineers from Canada. Each of the two sections also acted as advisors to special commissions for the two governments. The commission for the United States was known as the St. Lawrence commission and had as its chairman Herbert Hoover, then secretary of commerce. The parallel commission appointed by the government of Canada was known as the National Advisory committee.

The joint board of engineers presented its report Nov. 16, 1926, the various appendices and detailed plans following in the subsequent year. This board presented revised plans for the improvement of the river at a cost of approximately $400,000,000, including the development of power with an installed capacity of approximately 2,600,000 horsepower.

The United States St. Lawrence commission considered this report, and its conclusions were transmitted to congress by the President on Dec. 27, 1926. The commission found that the construction of the shipway between the Great Lakes and the sea is imperative, both for the relief and future development of a vast area in the interior of the continent; that it should be constructed on the St. Lawrence provided that a suitable agreement can be made for its joint undertaking with Canada; that development of the St. Lawrence power reserves should be undertaken by appropriate agencies; and that negotiations accordingly should be entered into with Canada. The Canadian advisory board subsequently submitted a report to the Canadian government which, while not specifically recommending the improvement of the waterway, set forth a suggested plan for the division of the costs between the two governments.

The Canadian government is now engaged in removing rock shoals in the channel of the St. Lawrence river on its side of the boundary between Lake Ontario and Prescott, just above the head of the first rapids, to afford a channel 24 feet in depth and 450 feet wide. The river and harbor act approved July 5, 1930, authorized the corresponding work in this section of the river on the American side of the boundary to provide a channel 27 feet in depth. It is anticipated that funds applicable to carrying out this relatively minor part of the project will be appropriated by congress and that this work will be actively prosecuted during 1931.

The question of whether construction of the St. Lawrence deeper waterway project is economically justified has resulted in widespread controversy and argument. Space does not permit repetition of this. To any one who is keenly alert to the economic welfare of the country and the greatest good to the greatest number, improvement of the St. Lawrence is a very important step in virtually plac-

ing the great industrial middle west on salt water.

To carry on work on the improvement of the St. Lawrence to provide a channel depth on the American side between Ogdensburgh and Lake Ontario, a sum of $350,000 was allotted March 12 by the secretary of war.

Great Lakes-to-Mississippi Waterway

THE Great Lakes-to-Gulf waterway will utilize the route of the Illinois and Mississippi canal, the Illinois river, the Illinois and Michigan canal, the Chicago Sanitary canal and the Chicago River and when completed will provide a through waterway from Chicago to the Mississippi. The state of Illinois in 1908 voted a bond issue of $20,000,000 for the construction of an 8-foot waterway from Lockport to Utica, Ill., connecting the Chicago Drainage canal with the upper limits of the Illinois river improvement, being carried out by the federal government. This canal is to have minimum bottom width of 200 feet and five locks 110 feet in width, 600 feet in usable length, and 14 feet depth over miter sills. Substantial progress is now being made on this improvement.

The Illinois river, another section of this waterway flows from a point 50 miles from La Salle and empties into the Mississippi at Grafton, Ill. Before improvement, the Illinois river in higher stages was navigable by the larger Mississippi boats as far as Utica, 230 miles. The last project (under way fiscal years 1929 and 1930) provided for a channel with least dimensions of nine feet in depth and 200 feet in width from the mouth to Utica. Work on the nine-foot project of the Illinois river between the mouth and Utica, Ill., was carried on vigorously during the fiscal year ending June 30, 1930. Dredging was completed for a total of ten miles of the river and partially completed for a total distance of about 27 miles, resulting in the project from the mouth to Utica being about 47 per cent completed. Cost of work during the year amounted to $737,164.60 all for new work. Controlling depth at the end of the year was 6½ feet.

By the terms of the rivers and harbors act of 1930, the federal government assumes responsibility for completion and operation of the Illinois waterway and its appurtenances, but requires the state of Illinois to construct or reconstruct all necessary highway bridges. Improvement of the Illinois river was also authorized upstream from Utica, Ill., by way of the Illinois and DesPlaines rivers for a distance of about 65 miles to a connection with the main channel of the Chicago sanitary and ship canal, which extends from Lockport to Lake Michigan a distance of about 35 miles.

Subsequent to the end of the fiscal year June 30, 1929 work on the project has been going ahead to secure the projected nine-foot depth and to re-build locks and dams at La Grange and Kampsville. A total of $2,361,985 was allotted on March 12 by the secretary of war for work on this waterway. Of this sum, $33,685 was allotted for work on the Illinois & Mississippi canal and $2,328,300 for work on the Illinois river.

The Great Lakes and Ohio river are to be connected by another link to be known as the Beaver-Mahoning-Shenango waterway. Surveys are going ahead at the present time, and work is to begin in the near future. This waterway will begin at Beaver, Pa., on the Ohio river and enter Lake Erie at a point near Ashtabula, O. The length of this waterway is approximately 101 miles. Channel dimensions are to be 188 feet width and 12 feet depth. Reports of tonnage available for this waterway estimate that it would be about 20,000,000 annually. The total estimated savings on this amounts to $12,425,000.

Gulf Intracoastal Waterway

THE Gulf Intracoastal waterway when completed, will extend from New Orleans to Corpus Christi, Tex., covering a distance of some 720 miles. Beginning at New Orleans it will pass through the Port Arthur canal, through Galveston and thence to Corpus Christi. Construction of this waterway was deemed necessary because of the fact that water borne commerce of southern Louisiana cannot reach suitable markets by all-water route without risking the dangers of open navigation on the Gulf of Mexico unless inland canals and waterways are constructed. The portion of Louisiana bordering on the Gulf is well adapted to such canals and waterways due to a great many lakes and streams as well as the low elevation of the land itself.

On the stretch between the Atchafalaya and Vermilion rivers, the improvement contract was entered into under date of June 26, 1930. On the section between Vermilion and Mermentau rivers the contractor began work on Aug. 26, 1929 and at the end of the year had carried on dredging operation a distance of 13.9 miles. Maintenance dredging was also carried on on the former 5 x 40-foot canals. Total cost of work during the year amounted to $464,059.87. In the section between the Sabine river and Corpus Christi, Tex., no work has yet been done since local interests have not furnished the necessary rights of way. Maintenance dredging of the 5 x 40-foot channels of this section was carried out during the year at a cost of $86,708.42. In the allotment made March 12 by the secretary of war approximately $1,484,000 was for work on this waterway.

Atlantic Intracoastal Waterway

THE Atlantic intracoastal waterway extends from Miami, Fla., through Jacksonville to Savannah, Ga.. Charleston, S. C. and the Cape Fear river, N. C., a distance of about 850 miles.

Eventually improvement will provide a channel eight feet deep and 75 feet wide between Miami and Jacksonville, one 7 feet deep with varying widths of from 75 to 150 feet between Jacksonville and Beaufort, S. C. (includes natural channel through St. Johns river with existing depths better than the projected ones); a channel 7 feet deep at mean low water and not less than 75 feet wide between Beaufort and Charleston, S. C.; a channel four feet deep at mean low water and 60-70 feet wide between Charleston and Georgetown; and a channel eight feet deep and 75 feet wide between Georgetown, S. C. and the Cape Fear River, N. C.

During the fiscal year ending June 30, 1930, work of maintenance on the section of the waterway between Winyah bay and Charleston was carried on at a cost of $44,221.03. Controlling depths in this section of the waterway were 3½ to 4 feet, for widths of 40-50 feet. In the section between Charleston and Beaufort, S. C., shoals were dredged, the cost being $4306.07. Controlling depth is seven feet for a width of 75 feet except in two places where recent shoals have developed limiting the depth to five feet and the width to 50 feet. Between Beaufort, S. C., and the St. Johns river, Fla., dredging operations were carried on at a cost of $72,077.96. Controlling depth over this section is five feet. Between Jacksonville and Miami, dredging was done to restore original project depths in the Florida-East Coast canal. Cost during the year amounted to $128,930.86. On March 12 the secretary of war allotted approximately $2,791,000 for work on the Atlantic intracoastal waterway.

In the 1930 river and harbor bill, the secretary of war is authorized and directed to have made preliminary examinations and surveys for a waterway for barge traffic across southern Georgia and northern Florida to connect this Atlantic intracoastal waterway with the proposed Gulf intracoastal waterway by the most practicable route. Additional examination and survey is authorized for a waterway from Miami, Fla., to Key West, with a view to constructing an extension to the Atlantic intracoastal waterway. Examination and survey is also authorized for waterway connections from the Mississippi river to the Atlantic intracoastal waterway and also a channel from Palacos, Tex., through Matagorda bay to a connection with the Gulf intracoastal waterway.

Marine Terminal Design from the Operating Point of View

Part II*

THE digrammatic cross sections of quay and pier types, Figs. 7, 8 and 9 sections I to VIII, indicate the general range of designs for various conditions, and some of the sketches are of actual terminals such as the recently completed state pier at Mobile, Ala., section I, Fig. 7, New York city piers, section V. Fig. 8; Norfolk and Western, Western Maryland and Pennsylvania railroad piers, sections VI, VII and VIII, Fig 9 respectively. Sketches II and III, Fig. 7, do not represent any particular terminal but show the combination of multi-story warehouses with transit space. The army base terminal at Boston is somewhat similar to section II, Fig. 7, although it is not symmetrical and its street is not depressed below warehouse and transit shed floor levels. Terminals similar to these have heretofore been more familiar abroad but some of these general types have been constructed in this country and Canada in recent years. They provide for efficiency in combined operation of transfer and warehousing facilities and provide for the complete marine terminal with reasonable economy of land.

It is, of course, possible to concentrate these facilities even more in case of necessity.

Sketches IV and V, Fig. 8, represent transit pier types only, without warehouses, sketch V, Fig. 8, represents space generally desirable for loading and unloading large cargoes or for combination passenger and freight business of considerable magnitude. Peculiar needs—such as comparatively small cargoes brought to and from the pier principally by lighter and truck, the relatively high importance of passenger business, and the extremely high land costs obtaining have resulted in type V, Fig. 8, for part of New York's marine terminals.

Sketches VI, VII and VIII, Fig. 9, represent some random railroad marine terminals. It is believed that other Norfolk and Western piers have apron tracks as well as central depressed tracks. Sketch VII, Fig. 9, is the one story pier of the terminal of the Western Maryland railroad described before your society. This terminal also has a two story shed with set-back at second floor level. Sketch VIII, Fig. 9, shows one of the piers of the Pennsylvania's new "rail-to-keel" terminal in Jersey city which has also been the subject of a recent meeting.

The sketches indicate some typical vessels at piers. The relation of vessel to pier—in place, coming in, going out, at high and low water stages, and at extreme loading conditions—is obviously especially important. In this connection typical locations of overall hatches, side ports, passenger ports, gangways, dimensions and clearances of cargo handling devices and cargo and drafts, should, of course, be gone into in detail.

As stated elsewhere space conditions and real estate values have very great influence on the terminal design. Sketches I, II, III, IV, Figs. 7 and 8, might be taken as illustrative of the range in space which might properly be occupied by a complete marine terminal unit of berths, transit sheds, warehouses, drives and tracks. Sketch I, Fig. 7, Mobile, sub-units are all located on the same general level—one story construction. Section II, Fig. 7, warehouses and transit sheds contracted in ground area and expanded upward. Section III, Fig. 7, also shows warehouse and transit sheds combined and one drive omitted.

The provision for receiving cargo on the wharf at the head of slips at terminals (known in New York as bulkhead receiving) has proved to be an effective means of expediting street trucks with consequent traffic advantage. When piers are narrow it has also reduced the cost of cargo handling through reduction of congestion on the piers. When a ship is working cargo, shippers' trucks on a pier delivering cargo are a serious obstacle to economical and safe operation. In many cases the loads of most of the trucks are small and it is possible to keep them off the piers without any great difficulty. One steamship company found that 75 per cent of the trucks handled only 25 per cent of the cargo. Receiving on wharf at head of slip kept practically all the 75 per cent off the narrow, congested pier.

Such receiving is *only* economical when mechanical equipment is avail-

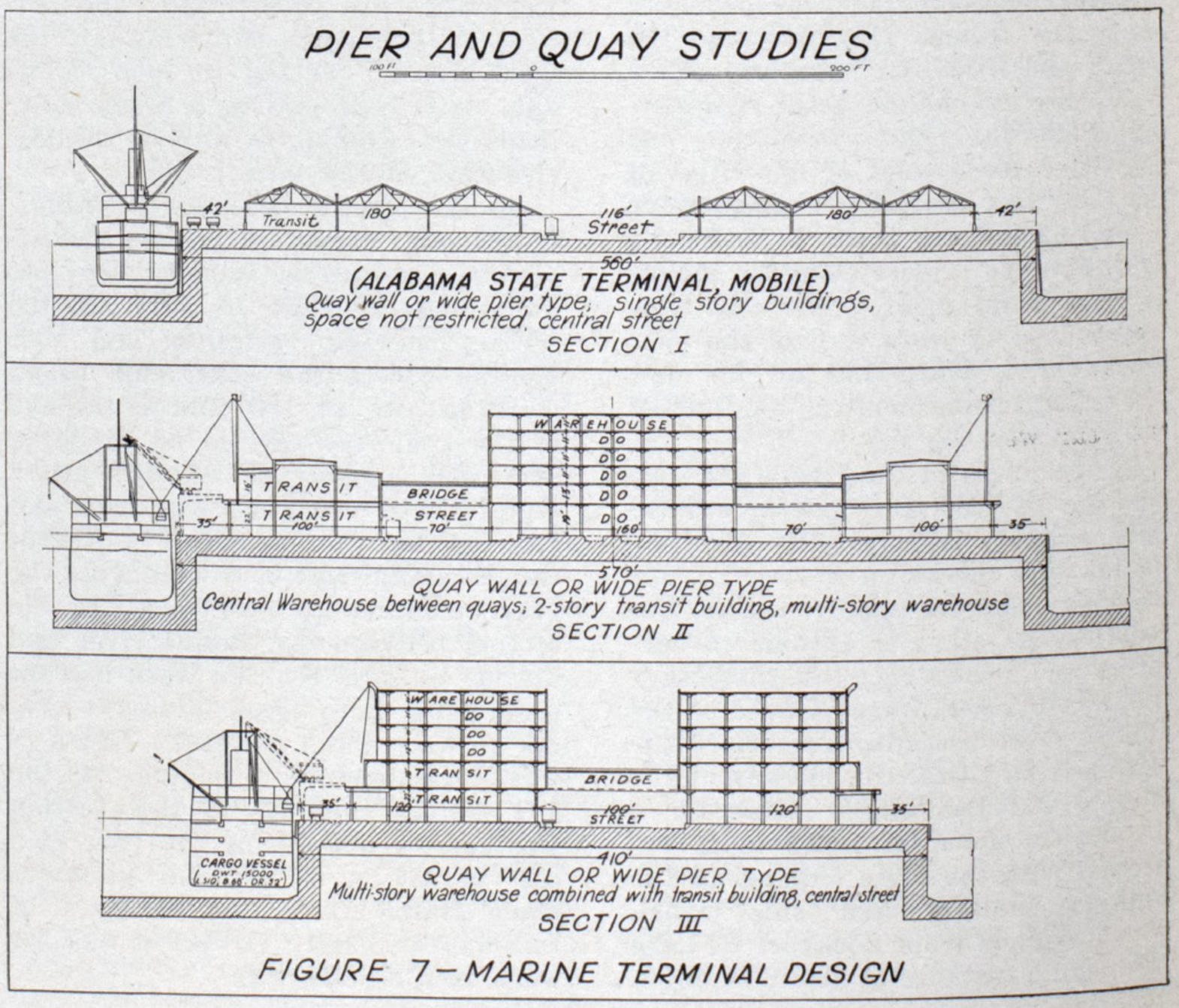


FIGURE 7—MARINE TERMINAL DESIGN

*This is the second instalment of a paper on *Marine Terminal Design from the Operating Point of View,* presented before the Society of Terminal Engineers at the Engineering Societies building, 29 West Thirty-ninth street, New York City, Feb. 9, 1931. The authors of this paper are: Frederic R. Harris, rear admiral, C. E. C. U. S. N. retired, consulting engineer; Harry E. Stocker, resident manager McCormick Steamship Co., New York, and contributing editor MARINE REVIEW; William B. Ferguson, consulting engineer; Roy F. Bessey, vice president, Frederic R. Harris Inc., consulting engineers. Published in three parts, the third and last part will follow in the May issue of MARINE REVIEW.

able to move the freight at the wharf at head of slip to the ship or to a designated place on the pier. Tractors and trailers are generally used to do this work in addition to other work about the terminal. Mechanical equipment can haul goods comparatively long distances at a low cost so that the cost of the additional haul is more than offset by the advantages resulting from a less congested pier.

Good examples of head of slip receiving are found at piers 18 and 19, North river, of the Eastern steamship Co.; pier 36, Clyde line; and Hudson River Night line, also located in New York harbor.

The height of the head of slip or bulkhead platform above roadways is important. Platforms should be built so that the trucks or skids used are slightly lower than the majority of the street truck platforms. Sometimes it is advantageous to have a platform with a saw-toothed face.

Use of Side Port Facilities

The increased use of side ports especially in coastwise and passenger vessels and the unquestioned value of the greater provision of side ports makes desirable the designing of terminals to further the use of this facility. A great range of tide is an obstacle to the use of side ports unless some provision is made to facilitate the movement of trucks and trailers into and out of ports. Ramps cut into the deck of the pier are of material assistance in working side port ships and in handling freight to and from lighters and other small craft. An economical method of overcoming a range of tide is the use of Barlow type of shipside elevator.

The width of wharf aprons is another feature of terminal design that is important from the standpoint of economical cargo handling. The desirable qualities of any quay or pier are an apron that will permit the ready handling or picking up of slingloads, ample space for assembling, sorting and handling of incoming and outgoing cargoes, easy access and ample loading space for land transportation units.

However, requirements vary. For example: the requirement for cargo space will change greatly with the class of service (overseas or coastwise; freight, cabin, or express lines and solid or partial cargoes).

In some cases it is imperative that the apron be narrow, whereas best operating conditions demand wide aprons.

The question of type of transit shed must be solved in each individual case; because as for other terminal features, there is no general rule. The design must, of course, be based primarily on the space required to handle the anticipated cargoes as economically as practicable and with the least possible congestion and delay.

One story sheds are probably better where there is ample space and the service is primarly freight. Two story sheds may be needed for freight service where land is valuable and space restricted. They are also very desirable where there is a heavy passenger traffic in order to provide the space necessary for passengers and to permit segregation of passenger traffic from freight traffic. If two decks are provided a ship may discharge to the upper deck while cargo is being accumulated on the lower deck. A very great advantage is the oportunity of discharging cargo from some hatches and loading cargo from other hatches without being forced to truck cargo long distances. The ability to discharge and load at the same time is especially valuable when various hatches finish unevenly. Ramps (or elevators, if ramps are not practicable) are preferable for handling street trucks to and from upper floors.

Heavy Lift Elevators Needed

Double deck terminals if provided with elevators should have these of sufficient size and weight capacity to lift big motor trucks fully loaded. A loaded truck weighing 20 tons should be considered. Direct delivery to truck is preferred to delivery by chutes because the latter method requires additional handling expense from place of rest to the chute.

A landing platform for the second floor is advisable on double deck piers for the same reason that aprons are desirable for the main deck, because, slingloads can be handled with less delay. This has been accomplished at some terminals by extending a movable platform far enough to receive the slingload. At the Western Maryland terminal at Baltimore the shed side of the upper floor is set back to provide a platform 10 feet 6 inches wide. The refrigerated terminal at China basin, San Francisco has a mov-

Norfolk and Western Terminal at Norfolk, Va. For Handling Coastwise Vessels with Their Varigated Cargoes

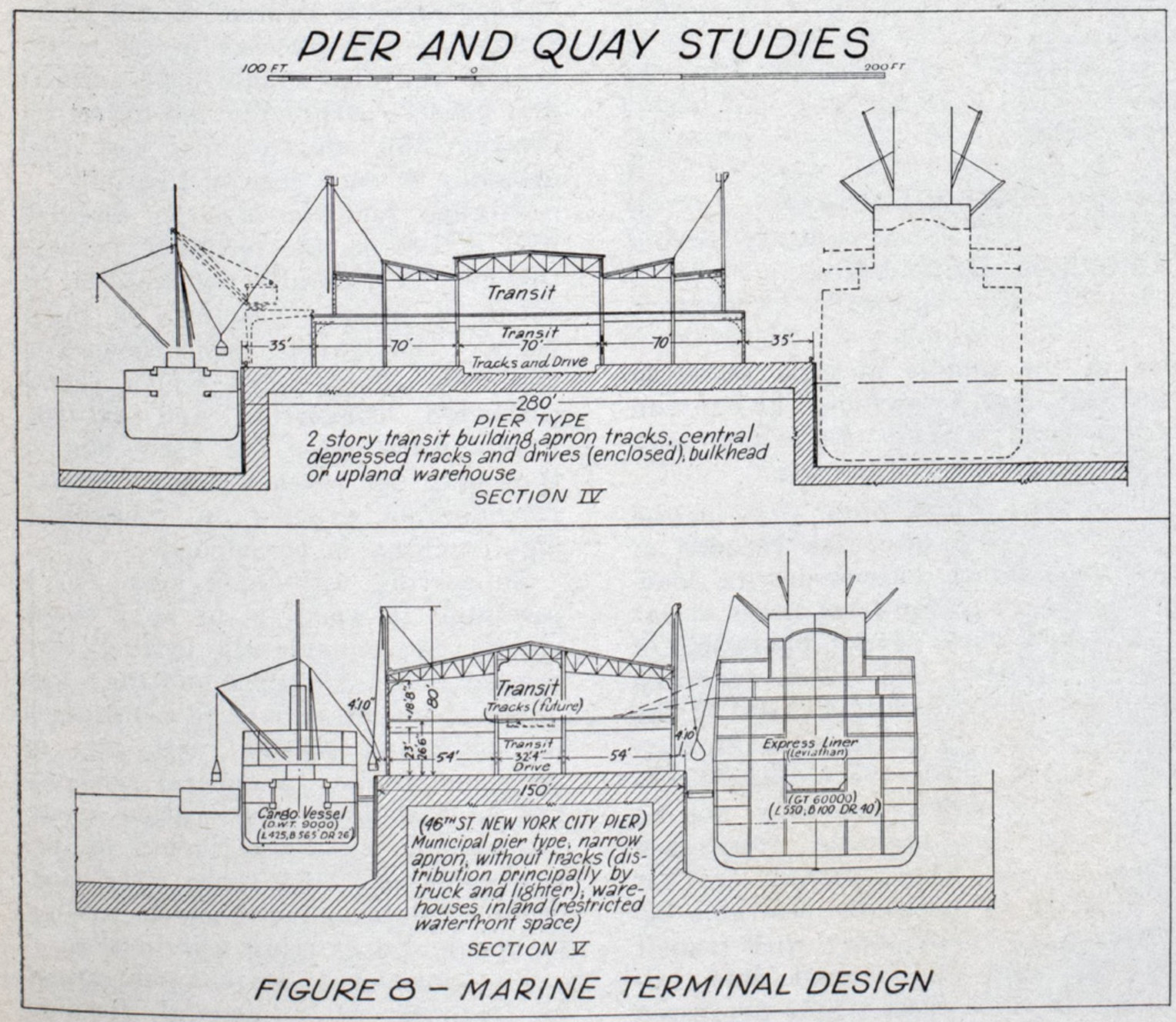


FIGURE 8 – MARINE TERMINAL DESIGN

able platform at the level of the second floor which travels along the main deck apron. A rail is provided on the apron near the stringpiece and another rail on the second floor to carry the wheels on which the platform moves.

With multi-story sheds, set backs or other efficient landing spaces for cargoes, at upper stories, should be provided where practical. The design of sheds should provide for the necessary loading and unloading facilities, such as masts or cranes, as frequently landing places cannot be reached by ships' tackle and as such facilities are

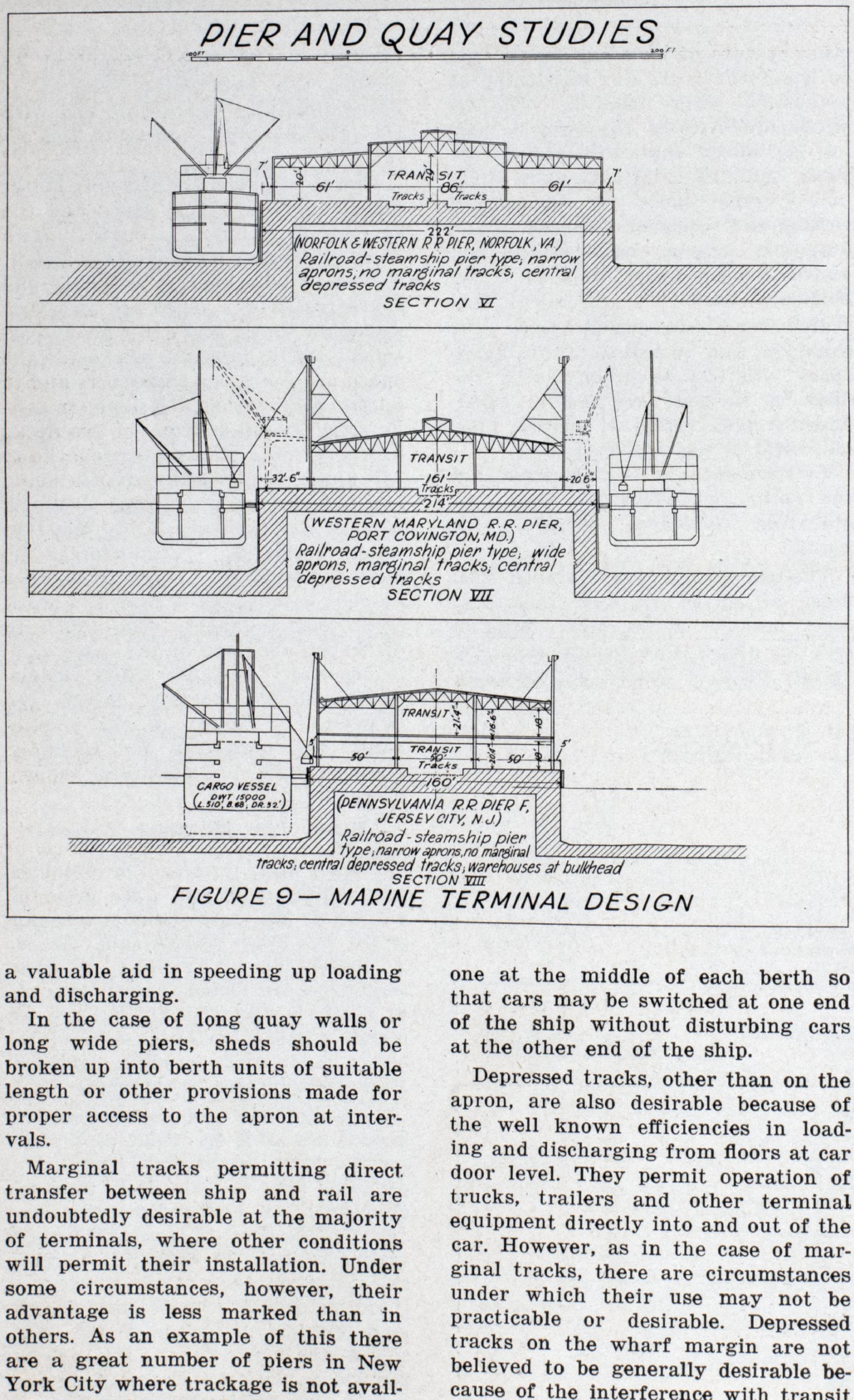


FIGURE 9— MARINE TERMINAL DESIGN

a valuable aid in speeding up loading and discharging.

In the case of long quay walls or long wide piers, sheds should be broken up into berth units of suitable length or other provisions made for proper access to the apron at intervals.

Marginal tracks permitting direct transfer between ship and rail are undoubtedly desirable at the majority of terminals, where other conditions will permit their installation. Under some circumstances, however, their advantage is less marked than in others. As an example of this there are a great number of piers in New York City where trackage is not available and where, perhaps, the greater part of freight would be handled by truck and lighters even though tracks were available. Other potent factors in their omission in certain places are the lack of space and high land values. In many cases, however, such trackage effects, or would effect, very material savings in operating costs.

Marginal tracks should preferably be double or triple (space and other conditions waranting and permitting). with enough crossovers to permit spotting or removing cars at any berth without stopping operations at other berths. An ideal though not always practical track arrangement is having crossovers between berths and one at the middle of each berth so that cars may be switched at one end of the ship without disturbing cars at the other end of the ship.

Depressed tracks, other than on the apron, are also desirable because of the well known efficiencies in loading and discharging from floors at car door level. They permit operation of trucks, trailers and other terminal equipment directly into and out of the car. However, as in the case of marginal tracks, there are circumstances under which their use may not be practicable or desirable. Depressed tracks on the wharf margin are not believed to be generally desirable because of the interference with transit between ship and transit shed, although in some cases where depressed marginal tracks are used movable platforms have been installed for the landing of freight going to or coming from the shed.

Concerning terminal trackage, much more than the pier or wharf tracks. is necessary. Drill tracks are required for the spotting and removal of cars, and in addition supporting yard tracks are required to permit car service without inconvenient and expensive delays and congestion in waterfront operations. The requirements for such trackage will vary in each case. Supporting yards should however be located so that every operation can be closely coordinated with terminal operations and should be of sufficient capacity to act as a regulating reservoir for loaded and empty cars. Conditions such as real estate, existing railroad lines and other facilities, will of course make for an infinite variety of solutions of the problem of railroad connections and support.

When Roadways are Necessary

Roadway considerations are similar to those for tracks. The roadways serve the same purpose in street and highway terminal connections as tracks do in railway service. It may in many cases be desirable to provide for direct transfer between truck and ship. At a terminal where passenger service is featured it is very desirable that arrangements be made to segregate freight and passenger vehicular traffic so far as possible. This is desirable from the standpoints of convenience, safety and relief of congestion. In both freight and passenger service it is desirable to provide for the loading and discharging under cover wherever practicable.

Roadways, of course, should be arranged to provide easy access to terminals and also should have surfaces and grades, permitting the lowest operating and maintenance cost that economy in each case will permit.

Storage facilities are an essential part of the marine terminal. Perhaps this fact is generally not realized, because of present practices in many ports. The transit sheds themselves are used for storage—which causes confusion, congestion and expense. Public warehouses are used—and as they may not be conveniently located considerable expense in rehandling and trucking is occasioned.

Supporting warehouse space for a terminal, if waste is to be avoided, should be conveniently located with respect to transit space and the warehouse operation should be coordinated as closely as possible with pier or quay operations. A general rule cannot be laid down for location or arrangement, but these should be the best consistent with space restriction, economical transfer of goods, routing of goods and existing warehouses.

The capacity of warehouses cannot be reduced to a general formula

either. One and one-half times the berth capacity (in tons) of the terminal has been used but this empirical rule will not apply to most cases. Existing public warehouses must often be taken into consideration, as must ground space available, and other factors. Particularly important however is the best analysis that can be made of the prospective traffic, storage in transit rates and practices, the proportion that will go into storage and the average period of storage.

The character of space also depends on a number of conditions but the type most generally applicable is the multi-story fireproof building (generally flat slab because of economy, and with sprinkler operation). Cold storage space will be desirable particularly where ships with refrigerated cargo space are served. Storage space is to be considered in its broadest sense and includes not alone covered warehouses, but open storage, and storage track facilities. If any such required facilities are already conveniently available to the terminal they may perhaps be utilized and unnecessary duplication and expense avoided.

(To be Continued)

Change Inspection System

AT A recent meeting of the underwriters interested in Great Lakes grain it was decided to turn over to the United States Salvage association the supervision of the inspection of lake steamers for approval for grain carriage in place of the grain classification heretofore done by the Great Lakes branch of the American Bureau of Shipping.

A committee was appointed to work out the necessary arrangements, consisting of Galloway C. Morris, of the Insurance Company of North America, T. J. Goddard, of Chubb & Son, and C. C. Macy, of Appleton & Cox. All of the preliminary details, including the printing and distribution of the necessary inspection blanks and applications for grain inspections, have been completed and this new arrangement will be put into effect at the opening of the 1931 lake grain season.

Signs are apparent of a steady though gradual improvement in world trade, declares James A. Farrell, chairman of the National Foreign Trade council, in issuing the call for the eigtheenth national foreign trade convention, to meet in New York May 27, 28 and 29 next. World exports for 1930, as estimated by the council, amounted to about $27,000,000,000, almost six and a half billion dollars less than the export trade of 1929. In actual volume of export trade, however, figures now available show that, accounting for reduction in prices, the world in 1930 carried on 90 per cent of the export trade of 1929, and almost a billion dollars more in exports than before the war.

Tractor trailer trains can be operated to better advantage if wide aprons are provided as in the accompanying illustration

Passenger Traffic Grows

Passenger traffic to and from ports of the United States increased during the fiscal year ended June 30, 1930. This advance is brought out in the annual report on water borne passenger traffic issued by the United States shipping board bureau of research. A total of 2,445,601 passengers was carried compared with 2,379,080 during the fiscal year 1929, an increase of 66,521, or about 2.8 per cent.

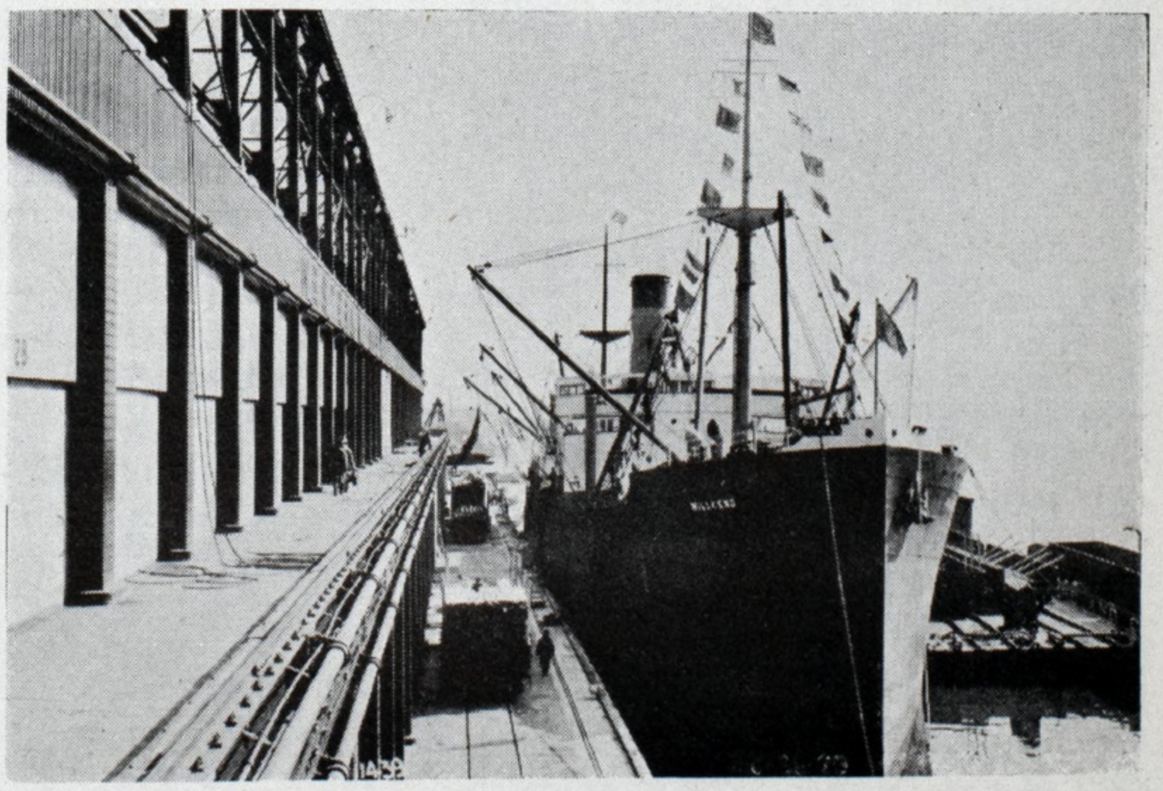
Reorganization of Company

Stockholders of the United States lines at the annual meeting held at 45 Broadway, New York, on March 10 voted for a reorganization of the company's board of directors, which resulted in naming five new directors. The new board of the United States Lines Inc. now consists of Paul W. Chapman, president of the company; M. B. Rogers, vice president; E. N. Hurley, wartime chairman of the United States shipping board and director of a number of large industrial companies; Franklin D. Mooney, president of the Atlantic, Gulf & West Indies Steamship Co.; Robert L. Hague, vice president and general manager of the Standard Shipping Co., an affiliate of the Standard Oil Co. of New Jersey; Ira A. Campbell of Kirlin, Campbell, Hickox Keating & McGrann, prominent admiralty lawyer, and Howard E. Cole, formerly first vice president of the Standard Oil Co. of New York and a director of the Chase National Bank.

Directors who were replaced were Joseph E. Sheedy, who has taken a long leave of absence as executive vice-president of the United States lines; T. S. Chapman lawyer; Berger Johnson, partner in P. W. Chapman & Co.; Glen Snider, lawyer and J. Molitor, vice-president, who represents the company abroad.

The shipping board on Feb. 24 approved the charter of two steel cargo steamers to the American Export lines for operation in the Black sea services of that company. The vessels are the WACOSTA and the GATEWAY CITY, 8727 deadweight tons each. They will supplement a fleet already in operation between New York and Black sea ports of Russia by the Export company.

The shipping board on Feb. 24 approved the change in the name of the Gulf Brazil River Plate line to Delta line. This line was purchased from the board by the Mississippi Shipping Co. of New Orleans.



Pier 9 McComas Street Terminal of the Western Maryland Railroad, Baltimore, showing landing platform for upper deck, shipside track and cargo masts

Refractory Brick in Marine Boilers

Severe Operating Conditions—Selecting Brick of Good Grade and Quality—Care in Laying Wall—Reduction in Maintenance Costs

Part II

By Lieut. C. A. Griffiths, U. S. Navy

SPALLING is the term generally given to the tendency of a brick to fracture due to thermal shock. When the changes in the temperature in a furnace are rapid the expansion on the face of the brick exposed to the fire is greater than the expansion further into the brick. This difference in the rates of expansion and contraction (as the cycle is reversible) sets up strains in the brick which result in cracks or fracture. In a carefully layed wall the effects of spalling are first notitceable in the form of cracks on the face of the wall; while in a poorly layed wall, or in aggravated cases of spalling, corners of the brick may become completely broken off.

Thermal shock may be induced by rapidly lighting off, or rapid cooling, or by suddenly developed air leaks in the wall. Care in gradually warming up with a slow fire will reduce the tendency of a brick to spall. When a boiler is secured all openings into the furnace should be closed to prevent ingress of drafts of cold air. In oil fired boilers, rapidly cutting in or out large numbers of burners will produce unequal expansion with the possibility of spalling cracks developing.

The selection of a fire brick that will resist spalling is very difficult as the property by which a brick will resist spalling is more or less obscure. The most probable factors which enter into the spalling resistant characteristics of a fire clay brick are those which are controllable during manufacture. After installation, the operation of the furnace and the operation of the burners in an oil fired boiler plays a most important part. Under steady steaming conditions spalling will not occur to such an extent as it will in fluctuating operation, because, during the former use, the brick becomes thoroughly soaked with heat, and the thermal strains are reduced in proportion as soaking progresses. Adequate insulation backing the refractory wall will also result in a more uniform distribution of heat through the fire brick and reduce the tendency to develop spalling cracks.

Fig. 4—Poor resistance to spalling. Good resistance to fusion and to shrinkage except in vicinity of spalling cracks. Wall well made up. Good grade of clay

In the lower right hand side of Fig. 4 a number of cracks in the face of the brick, which otherwise had excellent resistance to fusion and good resistance to shrinkage, are a combination of shrinkage cracks and spalling cracks. The brick in this installation was used in an oil fired furnace up to a temperature of 3000 degress Fahr. The wall was well layed with a good grade of clay, as can be observed in the left side of the figure. Spalling cracks developed when the fires were suddenly shut off and the furnace allowed to cool by the normal flow of air through the fire box.

Fig. 5 illustrates the use of a poor grade of fire clay. This clay had a low softening temperature which caused it to fuse and run down the face of the brick. The bricks beneath the joints show signs of fusion which are possibly due to the fluxing action of the clay when it ran down over the lower brick. The brick, otherwise, shows good resistance to fusion, spalling and shrinkage. It is obvious that a boiler furnace wall made up with a clay of this character would fail to give satisfaction; the bonding property of the clay is poor and the wall, consequently, weakened; and, the probabilities of exceedingly large quantities of excess air entering the fire box through the cracks of the wall are great.

Marine Boiler Operation

Boiler operation afloat is quite probably more rigorous than normal boiler operation ashore because of the fluctuating demands made on the boiler. Once clear of port, the necessity for rapid changes of firing rates due to maneuvering the ship are no longer required and steady conditions comparable to those found ashore can be obtained. Certain factors in operation are beyond the control of the chief engineer while others can be controlled by him to a greater or less degree. It is with the controllable factors that the marine engineer is vitally interested.

(a) A boiler steaming at the normal load will, if properly designed, have a temperature balance in which the factors entering into it will in no case be excessive. However, when the boiler is operated at, say, 100 per cent overload, a greater quantity of fuel is burned, the boiler is being forced, and the temperatures in the fire box, uptakes, and stacks will all be decidedly greater. It is obvious that a brick wall in a forced boiler, subjected to the higher temperaturse, will receive more severe treatment than it would under normal rates of operation. The consequences of continued steaming at forced rates with the resulting higher temperatures is more than liable to result in a rap-

---

This is the second and concluding installment of Lieutenant Griffith's article on the selection, laying and care of fire brick in marine boilers. The first installment appeared in the March issue.

idly reduced life of each of the bricks.

(b) Sudden demands for steam by the main engines must be met by rapid changes in the rate of steam evaporation in the boiler with a corresponding rapid change in the furnace temperature. This is particularly true with oil fired boilers. The effect of these changes can be somewhat controlled by the chief engineer with a well indoctrinated crew by instructing them in the care that must be used in operating the main throttles. Except in emergencies throttles should be carefully opened and closed and the throttlemen should be so trained. Rapidly opening or closing the throttles builds up or draws out steam in the boilers in rapid fluctuations which must be met by rapidly changing the firing rates.

Rapid changes in the firing rates not only results in the loss of the heat balance on which economical steaming is dependent, but, in addition, it introduces thermal shock in the refractory brick which may result in the development of spalling cracks. In any change of firing rate the air-fuel ratio, which it is assumed is properly balanced, is varied. This results in a change in the atmospheric conditions in the furnace which may become either oxidizing or reducing with the corresponding ill effect on the brick. Hence, whenever a change in the ship's speed is made, care must be exercised to bring the firing operations to the new conditions as quickly and as equally as possible.

Direction of Flame in Boilers

(c) As the brick work in an oil fired boiler is probably under more strenuous operating conditions than in coal fired boilers, the general discussion of brick failure hinges more on the ability of a brick to stand up in an oil fired boiler, and it may be safely assumed that a brick which will give good service in that type of boiler will give equally as good or better service in a coal burning boiler.

A brick being played upon by an oil spray will soon fail due to erosion of the brick from the force of the spray and the impregnation of the brick with oil which will probably act as a flux and lower the fusion point of the brick. The location of the tip in the burner, the adjustment of the burner, and the oil pressure are contributing causes for oil spraying on the furnace brick. Alteration of any one or all will probably result in proper flame direction. The large furnace volumes available in shore boilers which will give sufficient room for the oil fog to completely burn without impingement on the heated surfaces cannot always be obtained in marine boilers. For this reason greater care in adjustment and operation is essential.

(d) An excess of air in a furnace results in an oxidizing atmosphere; an insufficiency of air results in a reducing atmosphere. Certain materials in the brick fuse more readily than other materials when either of these conditions exist. A reducing atmosphere results in the more rapid formation of a flux from the impurities and oxides in the brick, and when that condition occurs, softening and fusion will possibly follow. In addition to being the more efficient steaming condition from the standpoint of fuel economy, which requiries a minimum of excess air compatible with complete combustion of the fuel, any deviation from the proper air-fuel ratio will have a harmful effect on the brick work.

(e) The ash from certain coals have ingredients which act as a flux and form a slag of the melted ashes. These fluxes are sulphur and iron in the form of pyrites in the coal as well as certain alkaline earths. If the slag from these impurities is carried into contact with the refractories, softening of an otherwise good fusion resisting brick will result. Coal, low in sulphur content, is desirable; and clinkers and ashes should be carefully and frequently removed on account of the possible detrimental affect on the brick work, as well as the effect on the boiler's economy.

Fig. 5—Poor quality fire clay with low softening temperature. Good fire brick

(f) In addition to reducing the overall boiler efficiency, dirty boiler tubes have a decidedly detrimental effect on the boiler brick. As dirty tubes reduce heat transference from the gases to the water to generate an equal amount of steam, the condition is somewhat analogous to that encountered in higher rates of steaming, in that greater furnace temperatures are required for the same temperature on the water side of the tubes. These higher temperatures reduce the life of the brick work proportionally. As the ill effects of dirty tubes are most noticeable in the boiler economy, it is presumed that the vigilant chief engineer will naturally avoid steaming with dirty tubes as much as possible.

(g) Whether through bolt holes, poor joints, cracks, or other means of ingress, air leaks into the fire box have a destructive effect on the brick work by setting up unequal stresses. These unequal stresses result in the formation of spalling cracks, and must be avoided. They can be eliminated to a great degree by proper attention to the face of the brick walls, filling up such cracks as develop, tightening bolts, and ensuring the absence of air leaks.

(h) Vibration is much more frequently encountered aboard ship than ashore, and, in general, is of a more serious nature and probably of more serious consequence. It may be due to a number of causes; the ordinary vibration from the machinery in use; the vibration from a propeller out of balance, or bent line shafting. Or, it may be due to the boiler panting. Of all the possible causes, panting has probably the most disastrous effect on the brick wall, reaching, in the ultimate case, the condition where the brick wall may be thrown down and absolutely destroyed. Panting will probably occur more frequently in firerooms under forced draft, particularly when the ship is maneuvering and rapid fluctuations in firing rates are required to meet the varying steam demands. Panting is a result of an improper air-fuel ratio and can only be offset by the proper training and the vigilance of the fireroom personnel.

The operating factors, in general, which have a detrimental effect on the life of a boiler furnace lining can be greatly overcome by proper attention to the details of fireroom procedure. At each opportunity the fire sides of boilers should be inspected.

Latest Data on New Marine Work

Information on New Ships Ordered—Building and Repair Contracts Let—Shipping Board Loans Made, Authorized or Pending

ON Mar. 1 there were under construction in American shipyards 26 vessels for foreign trade costing in the aggregate $116,838,324.64. In addition there were five vessels being reconstructed for overseas trade at a cost of $8,828,850. The majority of these vessels when completed will be operated in routes covered by ocean mail contracts under terms of the Jones-White law. Loans covering 75 per cent of the construction cost of these vessels, have been authorized by the shipping board. Since creation of the original construction loan fund of the shipping board in 1923, loans have been made on 42 vessels completed for domestic and foreign trade. The total cost of these vessels was $78,875,319.20. According to the monthly report of the shipping board vessels now under construction in American shipyards average about 33 per cent completion.

Three New Diesel Electric Ships Are Planned

According to reports the International Mercantile Marine Co. has decided to enter the Seattle-New York service with three new diesel-electric passenger ships, which it is said, will be faster and larger than the CALIFORNIA, VIRGINIA and PENNSYLVANIA. Plans for the new vessels which will cost about $10,000,000 each have been virtually completed and bids will be asked in the near future.

New Eastern Ships Will Enter Service in 1932

The two new steel ships to be built by the Newport News Ship Building & Dry Dock Co. for the Eastern Steamship Co., contract for which was announced in the March issue of MARINE REVIEW, will be ready for service in 1932. One of the ships, which will operate between Boston and St. John, N. B. is scheduled to make her maiden voyage on May 1 and the other ship, which will run between New York and Yarmouth, will make her first trip on June 15.

The new steamers will be twin-screw, oil-burning ships with a speed of 20 and 22 knots and a cruising radius of 13 days at 18 knots. They will each have a capacity of 756 passengers in addition to a crew of 178 men and will have a freight carrying capacity of 158,900 cubic feet.

The ships will each be 402 feet 9 inches in length, 61 feet beam, will have a depth of 29 feet 9 inches and will be of nearly 10,000 tons displacement.

There will be 14 suites with tub baths, shower and toilet on each ship, 12 special rooms with toilet, shower, twin beds and folding upper berth; four special rooms with toilets, twin beds and folding upper berths, and 15 rooms with toilet, shower and Pullman berths. Thirty-seven special rooms will have toilets, upper and lower berths with settees, two staterooms with twin beds and folding berths, and there will be 102 staterooms with upper and lower berths and settees. Eighty staterooms will be equipped with upper and lower berths. Besides, there will be free berth accommodations for 57 men and 30 women. In the dining rooms, the seating capacity on each ship will be for 250 persons.

Each ship will have two sets of single reduction geared turbines of the shipbuilding company's Parsons type with underslung condensers, shaft horsepower of 11,400, four Babcock & Wilcox oil burning watertube boilers, a working pressure of 375 pounds with 210 degrees super heat or a total temperature of 650 degrees and the ships will be equipped with electric motor driven auxiliaries. Lux fire extinguishing and Rich fire detecting systems with steam smothering lines in all cargo compartments will be installed and an automatic fire alarm in each compartment and stateroom. In the saloon passageways there will be 12 sliding steel doors and the galleys will be electrically equipped.

Navy Department to Build Eleven Destroyers

Construction of eleven new ships will be undertaken by the department of the navy during the coming fiscal period. Due to necessary design and other preliminary work, contracts for the construction of ten destroyers and one destroyer leader will probably not be placed before July 1. Construction of the eleven destroyers will require an ultimate expenditure of $47,000,000, the leader being estimated at $5,000,000 and the other ten at $4,200,000 each. The final plans for the modernization of the three battle ships IDAHO, MISSISSIPPI and NEW MEXICO, are being completed and the selection of the yards where the work is to be done is expected to be announced in the near future. It is probable that the work will be done in East Coast navy yards. It is quite possible that some of the eleven destroyers may have to be built in private yards, since the work already on hand will make it impossible to build all of the vessels in navy yards.

Electrical Contract for Cruiser Is Awarded

Receipt of an order in excess of $500,000 from the navy department for the main propelling machinery and engine room auxiliaries for a new 10,000-ton treaty cruiser is announced by the Westinghouse Electric & Mfg. Co.

The new vessel, designated as Cruiser No. 38, is yet unnamed and will be built at the Mare Island yard, California. Her four main geared-turbines will deliver a shaft horsepower of 107,000 giving the vessel a speed of 35 knots. The electrical equipment will be a duplicate of that ordered for Cruisers 37, 34 and 36 all being for Westinghouse machinery. The cruiser will have a main armament of nine 8-inch guns.

Bids Opened for Building Two Suction Dredges

Bids were opened March 15 at the United States engineer's office, Memphis, Tenn., for the construction of two steel hull, self-propelled suction dredges. These vessels will be 214 feet long molded, 46-foot molded beam, 9-foot molded depth, 3-foot draft, and estimated weight 1073 tons. The hull will be of box shape with tunneled and raked aft body. There will be five side-to-side transverse bulkheads, four longitudinal bulk heads and a center line keelson. Partial bulkheads will be arranged to form foundations for the machinery, to enclose the bunkers and to separate the wings from the main body of the hull. The main deckhouse will be built entirely of steel 140 feet long, 35 feet wide and 12 feet high.

The propelling machinery will be vertical, triple expansion, marine type steam engines, each capable of delivering not less than 600 indicated horsepower at 180 revolutions per minute when supplied with steam

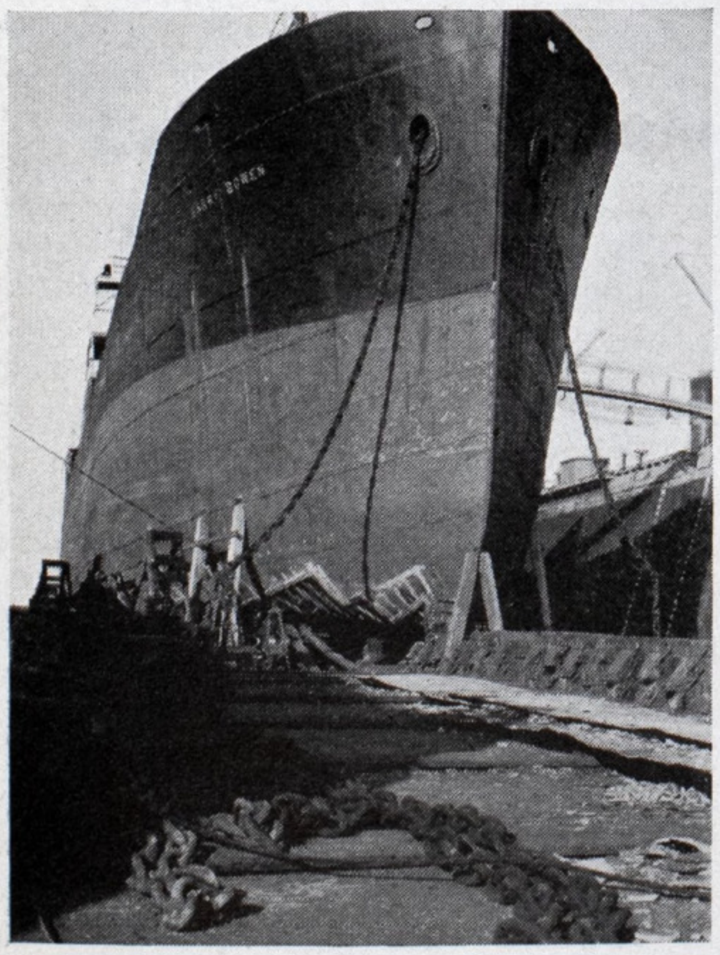
at 225 pounds per square inch pressure and 50 degrees Fahr. superheat, exhausting to a vacuum of 26 inches in the auxiliary condenser. The bore and stroke of the engines will be approximately 12 x 20 x 33 x 24 inches. Both engines will be full reversing and will be designed and built entirely in accordance with the rules of the American Bureau of Shipping. The boilers will be of the cross drum, watertube, marine type, with straight tubes and independent steel casing for each boiler. These boilers will be designed for a safe working pressure of 250 pounds per square inch. The furnaces will be arranged for the burning of oil as fuel.

The main dredging turbine will have a normal operating speed of 26 revolutions per minute on steam at 225 pounds per square inch pressure, and 150 degrees Fahr. superheat. This main turbine will be connected to a reduction gear by flexible coupling which in turn connects with the main dredging pump. The main dredging pump will be of the single suction type having a suction opening 34 inches in diameter. The reduction gear will be capable of transmitting loads up to 1400 brake horsepower.

Complete Heavy Repairs on Bottom of Steamer

The steamer HARRY BOWEN of the Pocahontas Steamship Co.'s fleet recently returned to service after undergoing extensive bottom repairs at the Morse plant of United Dry Docks Inc.

The job was completed in 45 days or 15 days ahead of contract time. It involved the renewal of all bottom plating, practically all frames and floors and installation of a new propeller. The HARRY BOWEN was damaged when she went aground off Montauk, Long Island, and pounded on the beach for several days before she could be pulled off.



Steamer Harry Bowen Docked at Morse Plant of United Dry Docks Inc.

An idea of the work involved is gained from the fact that 90 shell plates were renewed and 21 others faired; 55 full floor plates were renewed and 63 others were faired; 44 skeleton floors were renewed and 63 were faired; 127 shell frames were renewed down to the floors and 104 were faired; 151 intercostal plates were renewed and 352 others were faired.

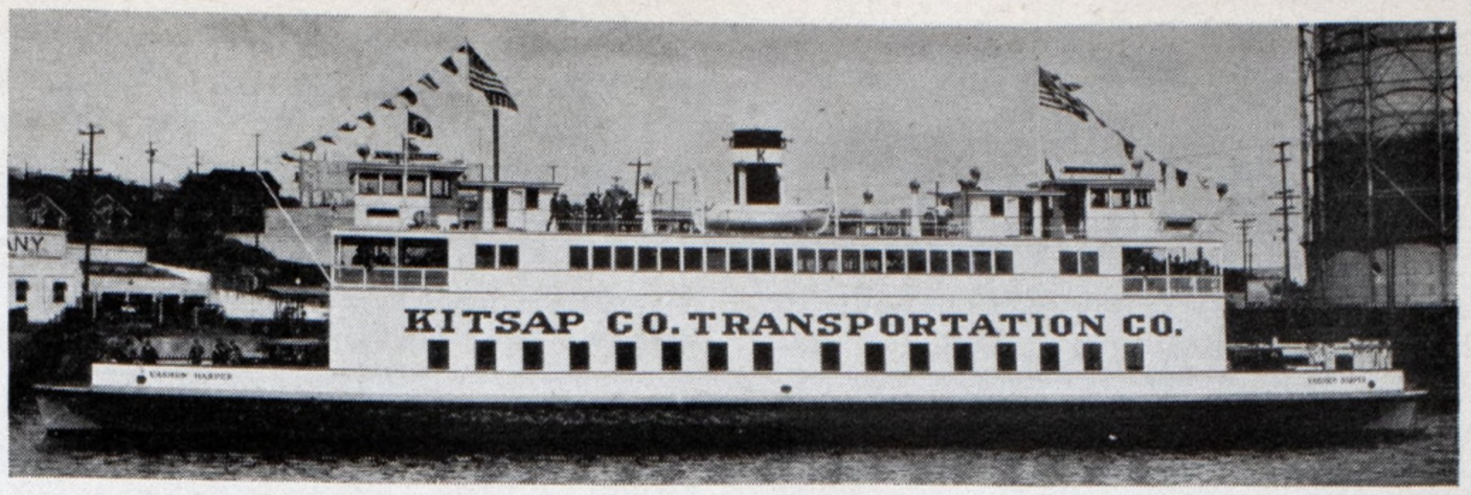
To Install Ballast Tanks

The Midland Steamship Co., Cleveland has awarded to the American Ship Building Co. at its Lorain yard the contract for installation of new ballast tanks in the steamer MICHAEL GALLAGHER. It is understood that the work will provide employment for approximately 100 men for about 2½ months. This vessel is 420 feet long, 54 feet beam and 28 feet depth. Work of installing the new tanks is to begin following completion of the scow which is being built at the yard for the Great Lakes Dredge & Dock Co., which is practically completed.

Large Double Ended Ferry In Service on Pacific Coast

The wooden passenger and automobile ferry VASHON shown in the accompanying illustration, was built for the Kitsap county Transportation Co. Seattle, Wash. by the Lake Washington Shipyards, Houghton, Wash. This vessel which was designed by Walter Lynch, naval architect of Seattle, Wash., was launched May 10, 1930 and completed May 30, 1930. She is built to the classification of the American Bureau of Shipping.

The particulars of the hull are as follows: Length over all, 200 feet; length between perpendiculars 171 feet 5 inches; breadth molded, 57 feet 6 inches; depth molded 16 feet 3 inches; draft light 12 feet; displacement light 751; gross tonnage 641; net tonnage 436; passenger capacity 1000 first-class; cargo capacity 90 automobiles; bunker fuel capacity 42 tons; average cruising speed, 12 knots; maximum speed 12½ knots.



Passenger and auto ferry Vashon built by Lake Washington Shipyards for Kitsap County Transportation Co.

The propelling machinery consists of one 8-cylinder, 18 inches bore by 24 inches stroke, 925 brake horsepower at 200 revolutions per minute, non-reversing four-cycle, solid injection, trunk piston type, diesel engine, built by the Washington Iron Works, Seattle, Wash.

The VASHON is the largest double ended ferry boat operating on the waters of Puget sound. She was designed from plans by Capt. John L. Anderson, president of the Kitsap County Transportation Co., under supervision of Walter Lynch, naval architect. Capt. Anderson has been engaged in local ferry service in waters adjacent to Seattle for many years. Through his experience he was able to work out a design which has proved very satisfactory for the needs of the route. The VASHON is operated between Seattle and Vashon island ports.

Travel to island and suburban centers on Lake Washington and Puget sound has increased greatly during the past few years.

Great Lakes Dredge & Dock Co. has built a new turbine tug which was launched March 21, at the yards of the Manitowoc Ship Building Co., Manitowoc, Wis. The vessel was named HARRY B. WILLIAMS, for the treasurer of the company. The tug's maiden voyage will be to Sault Ste. Marie, Mich., where the Great Lakes Dredge & Dock Co. is starting work on a large government contract.

Lay Keels for New Tugs

The keels of the four tugs to be built for the government have been laid at the yard of the Marine Iron and Shipbuilding Co., Duluth. Work is to go ahead rapidly on the vessels in order that they may be completed by July 1. This work involves approximately $200,000.

The vessels are to be 65 feet 6 inches in length and 17 feet beam. They will carry a complete electrical system and will be powered with 325-horsepower diesel engines. One of the tugs will be assigned to the United States engineer office at Duluth, two to the war department at Milwaukee, and the fourth to the government office at Buffalo.

Bids for United States Engineers' Equipment

The Wilmington, Del. United States engineer office has issued specifications for construction and delivery at Wilmington, Del. of one motor launch, 40 feet long, 11 feet wide, and 4.9 feet deep; wooden hull.

Referring to specifications issued by the San Francisco United States engineer office, March 7, 1931, for furnishing a 65-foot survey boat, bids were to be opened at 3:00 p.m. March 30, 1931. Sealed bids, in duplicate, were to be received until 3:00 p.m., March 30, 1931, and then publicly opened for drydocking, painting and repairing United States dredge A. MacKenzie. Guarantee will be required with each bid.

Plans and specifications were issued early in March for the construction of one 16-inch self-propelled pipe line dredge, complete. The specifications provide that a certified check for $200, made out to the order of "Disbursing Officer, U. S. Engineer Office, Vicksburg, Miss." shall be deposited to insure the return of the complete set of plans. Additional sets of blueprint plans may be obtained upon request of bidders who have deposited the certified check referred to above. These prints will be furnished at a cost of 50 cents per sheet for blueprints, and are not returnable. Bidders desiring additional blueprint sheets may obtain same at the above rates by application to this office, accompanied by a certified check or post office money order for the proper amount, drawn to the order of "Disbursing Officer, U. S. Engineer Office, Vicksburg, Miss."

Sealed bids, in duplicate, were to be received at the same office until 2:00 p.m. March 14, 1931, at the United States engineer office, first Chicago district, and then publicly opened, for furnishing all labor and materials and performing all work necessary for the furnishing and delivering, assembled complete and ready for installation, four lock gates of two leaves each, with anchorage members, mitre sill plates, valves, upper pintle castings, mitre and quoin timbers and bolt fastenings, for LaGrange and Kampsville locks, on the Illinois river.

Diesel Electric Equipment

Contract for the complete diesel electric equipment for a yacht building at the Bath Iron Works Corp., Bath, Me. for George M. Pynchon, has been awarded to the Westinghouse Electric & Mfg. Co. This yacht was designed by Henry J. Gielow Inc. and is 144 feet 6 inches long overall, 131 feet 6 inches at the waterline, 24 feet 10¼ inches beam and 14 feet 3⅝ inches deep.

The diesel electric equipment includes two main generators each of 270 kilowatt, 250 volt direct current shunt wound, 600 revolutions per minute which supply power to two 330 horsepower propulsion motors 250 volts, direct current, shunt wound at 300 revolutions per minute. The equipment also includes two 27 kilowatt 125 volt, compound wound, 600 revolutions per minute generators and other miscellaneous units for excitation and auxiliary power. Complete switching and control equipment is also included.

Alexander McNab, consulting marine engineer, has been awarded the contract for supplying 16 tonsionmeters, four on the U. S. S. New Orleans, four on the U. S. S. Minneapolis, four on the U. S. S. CL38 and four on the U. S. S. Astoria.

Prepare Liner for Trials Early in April

Already in outward appearance a completed sea-going giant, the new 42,500-ton Canadian Pacific liner Empress of Britain, largest ship built in Great Britain since before the war, will shortly become one in fact. Her interior construction has advanced so rapidly that she will be turned over to her owners in time to make her maiden voyage three weeks earlier than originally planned. She is scheduled to bow to the seas for the first time on April 5, during her preliminary trials. These trials, conducted by pilots of John Brown & Co., builders of the 755-foot liner, will check up compass adjustments, etc.

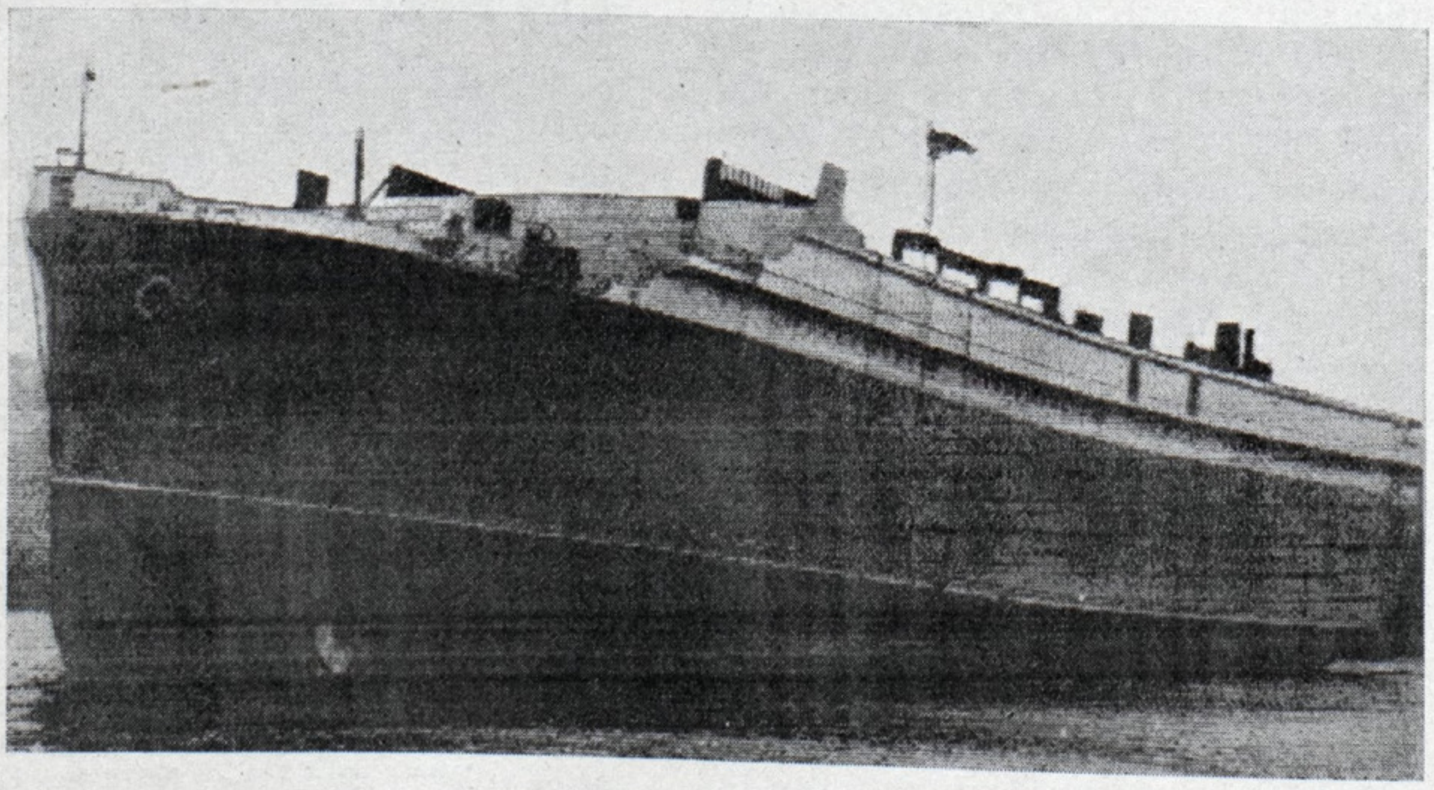
Following the tests the liner will return to Glasgow, sailing thence to Southampton where, at a later date, she will be turned over to the Canadian Pacific and will fly the red-and-white checkered houseflag for the first time. The Empress of Britain is due in Southampton Wednesday, April 15.

During the six weeks of her stay at Southampton until her maiden departure for Quebec on May 27, armies of workmen will be engaged on the final touches of her magnificent interior.

Diesel Engines Ordered

The Kitsap County Transportation Co., Seattle, has ordered from the Washington Iron Works, Seattle, a 560 brake horsepower Washington diesel engine to be installed in the wooden ferry Liberty. This unit is direct reversing, single end and is similar to a contract awarded a month ago to the same manufacturers for an engine to be installed in the wooden ferry Leschi, whose capacity is to be increased by 20 automobiles. Steam engines are being taken out of both ferries, as greater speed and

New Turbo-Electric Furness-Bermuda Liner Is Launched



SHOWN in the accompanying illustration is the new Furness-Bermuda liner, Monarch of Bermuda, as she was launched at the Vickers-Armstrong shipyards, New Castle-on-Tyne, Tuesday, Mar. 17. This vessel is 576 feet long with a beam of 76 feet 7 inches and will have accommodations for 950 first-class passengers. She will have turbo-electric propelling machinery which will give her a speed of 20 knots. She will enter the New York-Bermuda service next fall. The photograph from which the accompanying illustration was made, was received by radio.

economy in operating on local routes are desired.

The Washington Iron Works is also building a 475 brake horsepower Washington diesel engine for installation in a wooden ferry being constructed at Astoria, Oregon, for the Astoria-North Bend Ferry Co. This vessel measures 120 feet over all, with molded beam of 36 feet, 40 feet over all and depth of 11 feet. She is V bottom, semi-tunnel stern type to give her unusually shallow draft, of seven feet required by the route. There will be accommodations for 35 automobiles and attractive and comfortable passenger quarters. Architect Joseph M. Dyer, Astoria, Oreg., designed the vessel. The engine is of the 8-cylinder direct reversing type, 13 x 16, and will give the ferry a minimum speed of about 12 knots.

Lighthouse Tender Launched

The new lighthouse tender LINDEN was launched at Jacksonville, Fla., at noon Mar. 7, after being christened by Miss Anne Merrill daughter of J. C. Merrill, vice-president and general manager of the firm building the vessel. The launching was successful in every way, according to E. C. Gillette, superintendent of naval construction, who went to Jacksonville for the occasion.

The new tender, which will be completed some time during the coming summer, will be used in Chesapeake Bay, where she will join the fleet of the fifth lighthouse district.

General Electric to Equip New Panama Mail Liners

The four new twin-screw express liners which will soon be built at the yard of the Federal Shipbuilding & Dry Dock Co., Kearny, N. J., for the Panama Mail Steamship Co., to operate between San Francisco and Los Angeles and New York, will be propelled by two 6000 horsepower General Electric geared turbines. Auxiliaries will be electrified by General Electric equipment. At sea, the supply of auxiliary electricity will normally be from two 500-kilowatt generators attached to the reduction gears of the propulsion equipment, but this electricity may also be obtained from two 500-kilowatt turbine generator sets. The latter two sets will float on the electric system when the vessel is operating at the higher speeds but when the speed drops below 70 per cent of maximum, the turbine generator sets will automatically take over the electric load of the auxiliaries. In port, electricity will be supplied from a 200-kilowatt turbine generator set.

The new ships will be 508 feet long and 72 feet beam and will have a deadweight capacity of 16,600 tons.

Ship Construction Using Isherwood Design

SINCE the use of the Isherwood method of ship construction was first used there has been a steady increase in the number of ships on which this system of construction has been employed. The six vessels with a dead weight carrying capacity of 31,608 tons ordered between September, 1907 and 1908, increased to 1827 vessels of 15,357,460 tons deadweight carrying capacity completed during 1930.

The majority of the tankers completed in 1930 were built under the Isherwood principle of longitudinal framing. This type of construction has become practically universal where the longitudinal system is used. During 1930, 29 vessels of this type totaling 409,200 tons dead weight carrying capacity, were completed under this method. Since the year 1929 was an exceptionally good one for tanker construction, contracts placed during 1930 show a large decrease. Of the 29 large tankers built, all but two of them were constructed on the bracketless system developed by Isherwood. These two vessels were specially designed in collaboration with the owners, on the Isherwood combination system which combines the usual longitudinal construction with the ordinary system of transverse construction. This combination system is the net result of several important changes which the regular system of longitudinal construction has undergone to meet the conditions of modern ship design. This system of construction was used in building a number of cargo vessels and oil tankers laid down during 1930.

In the list of vessels constructed under this system during 1930 are six large tankers built for the Standard Shipping Co.; the tankers HARRY F. SINCLAIR JR., and VIRGINIA SINCLAIR, both built by the Fore River plant of the Bethlehem Shipbuilding Co. Ltd. for the Sinclair Oil Co., were also built on the Isherwood bracketless system. The list of vessels constructed under this system also includes the tankers G. HARRISON SMITH and W. S. FARISH built by the Federal Shipbuilding & Dry Dock Co. for the Standard Shipping Co. These two vessels represent the finest type of tankers built during the year. They are fitted with high pressure double reduction De Laval steam turbines, developing 4400 shaft horsepower at 75 revolutions per minute. Steam is derived from two water tube boilers with 5080 square feet heating surface designed for 400 pounds working pressure and with super heat. Among the 1930 contracts of vessels to be built under the Isherwood system are included five more oil tankers building at the Sun Shipbuilding Co., Chester, Pa., one 10,000 and one 13,000-ton tanker building at Burmeister and Wain, Copenhagen, a tanker of 11,000 tons for Norwegien owners, nine large oil tankers of 16,200 tons dead weight carrying capacity for the Standard Shipping Co. and a number of 10,000-ton tankers for the British Tanker Co. Ltd.

Plan Double Deck Barges

Plans for the construction of double-decked barges to be used in delivering automobiles to the distributing points on the Illinois-Mississippi rivers, are being prepared for the Ford Motor Co. These barges will be approximately 300 feet in length by 40 feet breadth and will have a capacity of 150 cars each. It is the plan of the Ford Motor Co. to operate these barges on the Great Lakes-to-Mississippi waterway when it is completed.

Bunker Prices

At New York

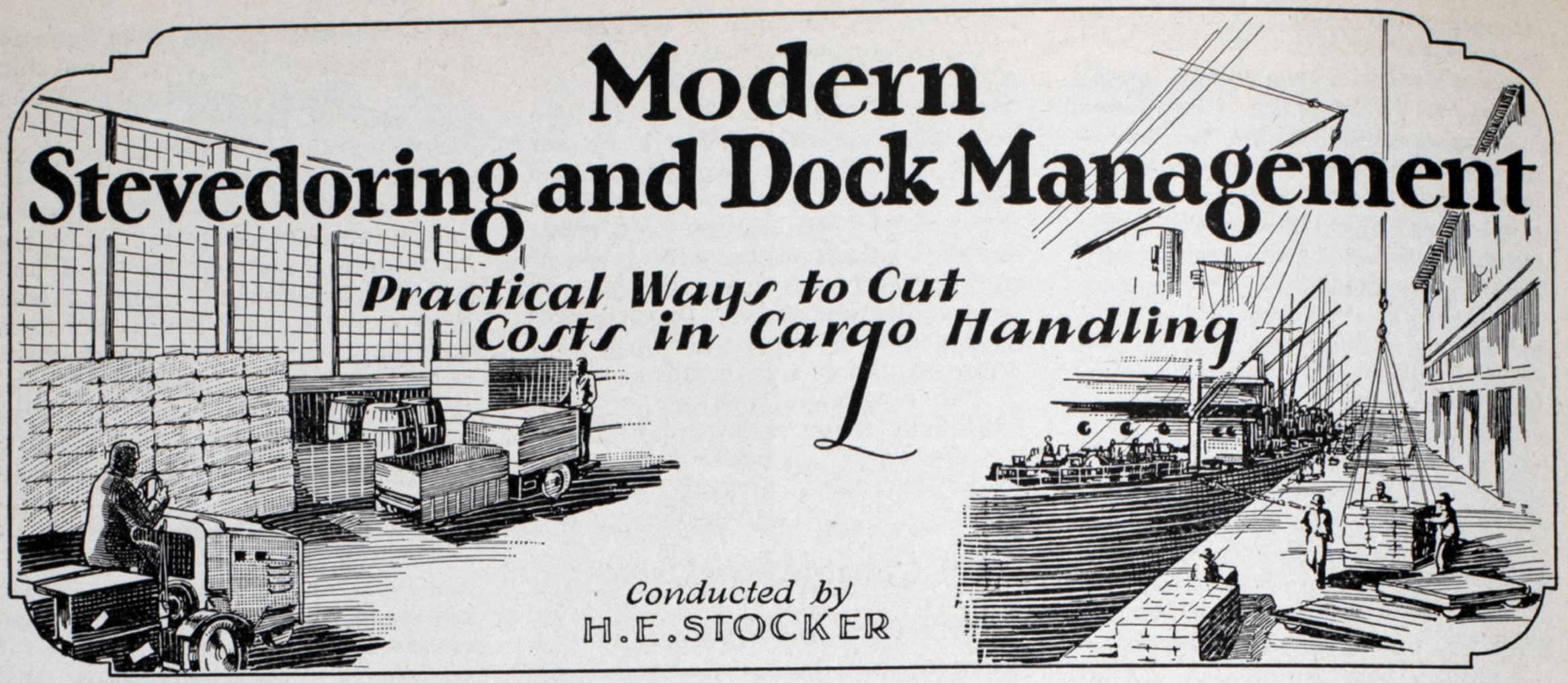
	Coal alongside per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
Mar. 18, 1931	4.85@5.25	1.10	4.55½
Feb. 18	4.85@5.25	1.10	4.55½
Jan. 18	4.85@5.25	1.10	4.55½
Dec. 18	4.85@5.25	1.10	4.55½
Nov. 18	4.85@5.25	1.10	4.92
Oct. 18	4.85@5.25	1.10	4.92
Sept. 18	4.85@5.25	1.10	4.92
Aug. 18	4.85@5.25	1.20	4.92
July 18	4.75@5.00	1.20	4.92
June 18	5.00@5.25	1.15	4.92
May 18, 1930	5.00@5.25	1.15	4.76

At Philadelphia

	Coal trim in bunk per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
Mar. 18, 1931	4.85@5.25	1.00	4.88
Feb. 18	4.85@5.25	1.00	4.88
Jan. 18	4.85@5.25	.85	4.88
Dec. 18	4.85@5.25	.95	4.88
Nov. 18	4.85@5.25	1.00	4.88
Oct. 18	4.85@5.25	1.05	4.88
Sept. 18	4.85@5.25	1.05	4.88
Aug. 18	4.85@5.25	1.05	4.88
July 18	4.75@4.50	1.10	4.88
June 18	5.00@5.25	1.20	4.88
May 18, 1930	5.00@5.25	1.20	4.88

Other Ports

Boston, coal, per ton	$7.25
Boston, oil, f. a. s., per barrel	1.11
Hampton Roads, coal, per ton, f.o.b., piers	$4.35 to 4.50
Jan. 8—Cardiff, coal, per ton	13s 6d
London, coal, per ton	—s -d
Antwerp, coal, per ton	19s 9d
Antwerp, Fuel oil, per ton	67s 6d
Antwerp, Diesel oil, per ton	82s 6d
British ports, Fuel oil	67s 6d
British ports, Diesel oil	82s 6d



Steel Hatch Covers for Greater Safety and Reduced Operating Cost

By Capt. K. Tvede and H. E. Stocker

DURING the last two years the question of hatch openings and their covers has been discussed by naval architects, by experts and by societies interested in shipping and in shipping problems. One government at present is investigating the advisability of public regulations covering adequate hatch covers. The importance of the subject is beginning to be realized.

In general, the larger the hatch opening the more advantageous it becomes, but it is obvious for structural reasons that when the hatch openings exceed a certain size, a more suitable and a stronger cover must be provided than the one generally found in use today, which consists of three inch planks laid on heavy steel strongbacks.

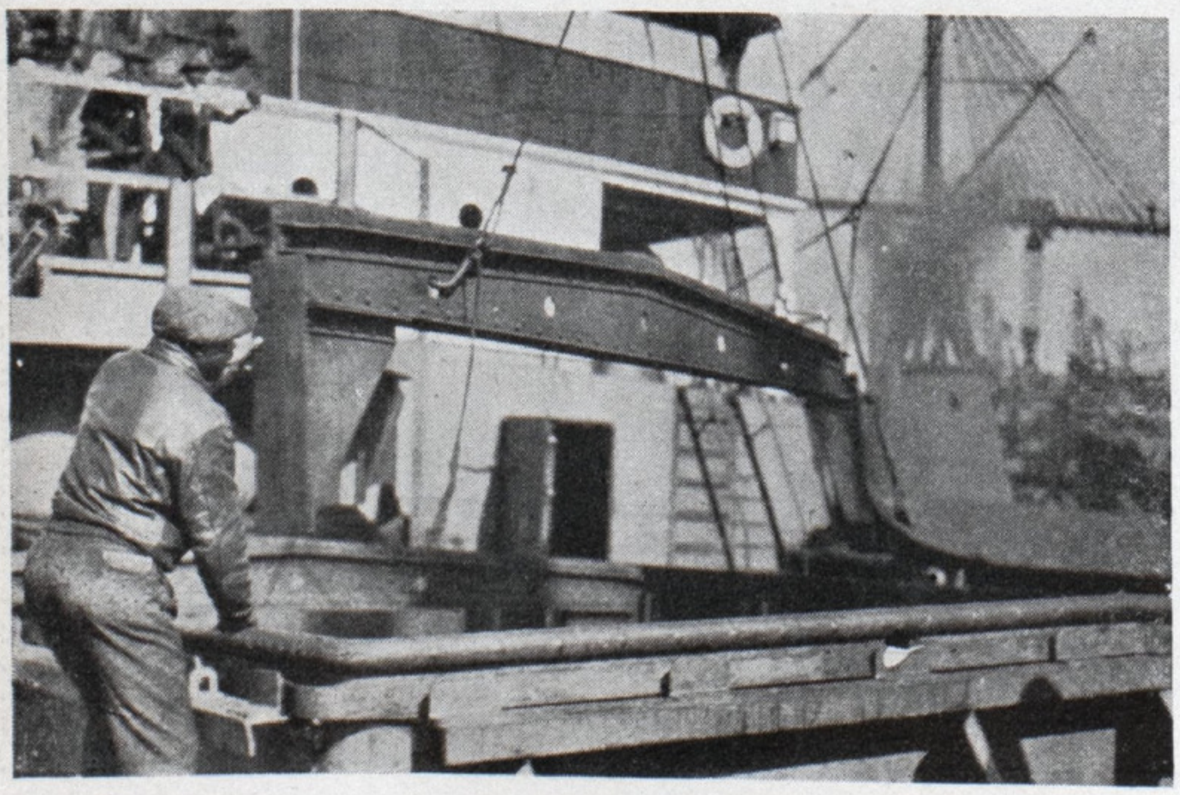
In this connection it may be worth while to follow briefly the developments of the hatch and its covers. In looking over shipping registered we find steamers built during the years of 1905-6-7 with hatches almost the full length of the working decks. During the same period we also find ships built for the same trade with hatch areas of about 10 to 20 per cent of the deck area. We can find trampships built abroad 25 years ago which have larger hatch openings than the ships built today. The records indicate that there has been no systematic development of number and sizes of hatch openings, that rather the number and sizes of openings depended largely on individual opinion, ships built for special trades excepted.

The first hatch covers used in ordinary tramp ships consisted of planks three inches thick cut in suitable lengths and widths and placed atwartship, supported by the necessary number of cross beams and longitudinal beams placed between the cross beams. These longitudinal beams were often of wood. Later this type of cover was improved by placing the hatch planks longitudinally and doubling the number of cross beams. This eliminated the longitudinal beams. This is not a satisfactory cover for a number of reasons principally from the standpoint of safety and quick handling, yet this cover is the cover used on practically 99 per cent of the world's fleet today.

The general trend is toward larger hatch openings in both tramp ships and cargo liners. The advisability of large hatch openings is so obvious and the savings so great in reduced stevedoring costs, reduced claims, great safety and quicker turn around of ship, that it is surprising that larger hatch openings and adequate covers have not been given greater consideration before.

The last year or two steel hatch covers have gained greater recognition. Several steel hatch covers have been brought on the market during this time.

Recent disasters at sea have led to a further investigation of hatch covers which has resulted in the recommendation of hatch covers of a



This illustration shows the slow and dangerous work which it would be well to eliminate by the use of steel hatch covers

stronger construction. A year or two ago two British coasting ships were lost and during a consequent investigation by the British board of trade, it developed that the probable cause for the disasters was obsolete wooden hatch covers. It was decided that if these vessels had been supplied with adequate hatch covers, the vessels would not have been lost.

Three new types of steel hatch covers have been put on the market recently, two of which are intended to make tarpaulins unnecessary. The development of steel hatch covers is not new.

The Von Tell steel hatch cover is the invention of Captain Von Tell, a Swede. This cover is made in two sections, hinged at the end coamings. Each section is also hinged. When hinged back the entire hatchway is open, and the covers are conveniently stowed. Tarpaulins, wedges, battening and locking bars are unnecessary and strongbacks are also eliminated. An important advantage is that the deck abreast of the hatchway is quite unencumbered, this being achieved by hinging of the covers at the end coamings. The operation of opening and closing can be effected rapidly by means of winches and ships tackle.

The Isherwood Steel Hatch

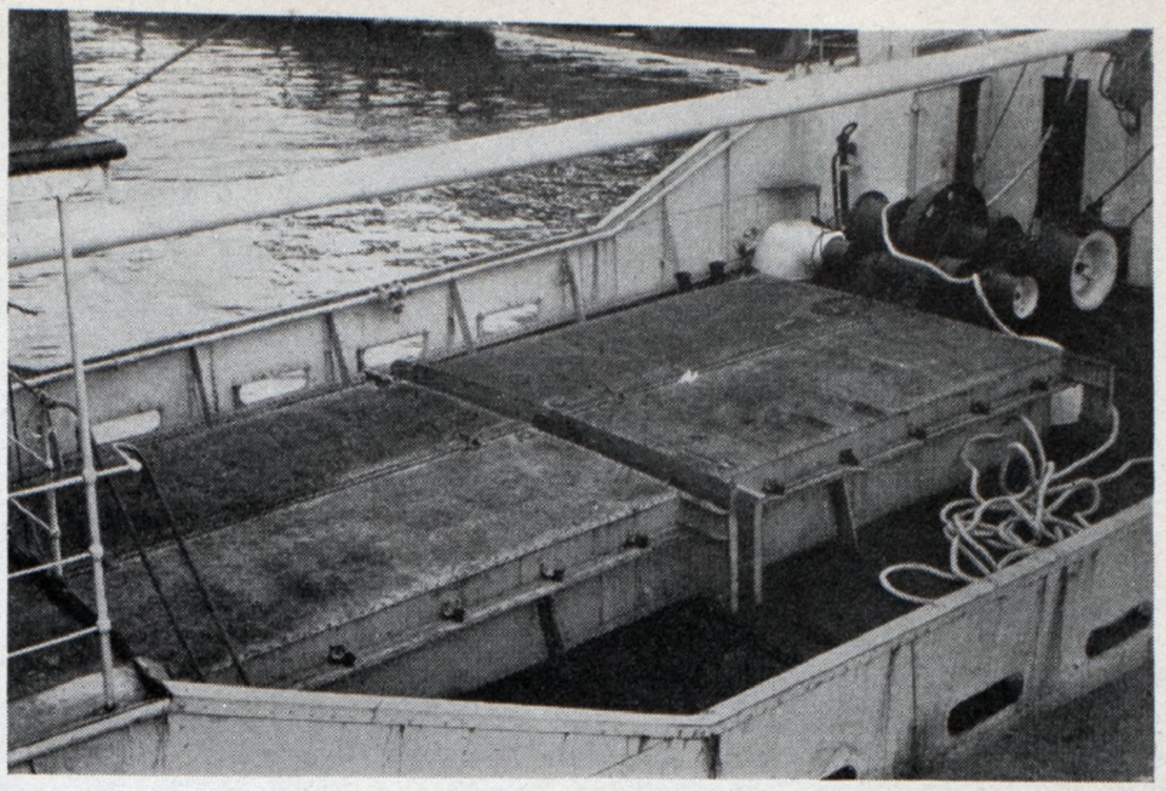
The Isherwood steel hatch is made up of steel sections which are small enough to be handled by hand. When the covers are all placed in position they are locked and held in place by a simple arrangement. The following description of the cover is from the Nov. 27, 1930, *Fairplay*.

"On each of the webs extending over the length of the hatch on which the covers are supported is fitted a sliding channel bar. On the sides of this channel are fitted wedge pieces of metal (the broad end of the wedge being at the channel top), which, when the movable channel is free, are placed adjacent to, and in opposition to, similar metal wedge pieces on the steel covers (the broad end of the wedge being at the bottom edge of the cover). The sliding channel is actuated by a simple screw gear fixed on the web beam and operated by hand power by a key inserted through a small hole made for the purpose through the top of the coamings.

"When the sliding panel is moved toward the side of the hatch, the wedges on the channel engage with the wedges on the covers and the whole are securely locked together. On the underside of the channel are fitted several steel wedge pieces, which slide into suitable fittings placed in opposition thereto on the hatch web beam, thus securely holding down the channel. The wedge pieces on the channel are somewhat longer than those on the covers, and so arranged that the covers may be disengaged by operating the screw gear while the movable channel is still secured to the hatch beam. When, however, it is desired to remove the channel altogether for cleaning or other purposes, this can be quickly and easily effected by a little more lateral movement of the channel bar itself by means of the screw gear, when it becomes quite free and can be lifted off. Each sliding channel is fitted in two sections, and operated in two movements, one from each side of the hatchway coaming, but it is obvious that the method of securing the hatches can be modified in several ways by the adoption of the device."

The "Macanking" steel hatch cover was described in the December, 1930, issue of MARINE REVIEW. The T & D sliding strongback was described in the June, 1930, issue of MARINE REVIEW. Wooden hatch covers are used with this sliding strongback.

Steamers on the lakes and some ships in the coastwise trade have had steel hatch covers for years. In 1912 two tramp ships were built in Sunderland, England, of 4175 tons deadweight, and were fitted with steel hatch covers of a simple design. These ships were provided with four hatches 24 feet by 12 feet and covered with steel hatch covers. There are three cross beams and four covers, making a total of seven parts to the hatch. If these hatches had been covered in the usual way there would have been five cross beams and 24 wooden covers, making a total of 29 parts to each hatch to handle. The vessels have been in constant service and have carried almost every cargo to almost every part of the world. In the 19 years these ships have been in use, the master of one of the ships reports that the only expense on the steel covers has been to renew about 100 rivets—and setting a price of $1 for each rivet—$100 has been spent in 19 years for repairs. The time saved in covering and uncovering the hatches, and the increased safety to vessel, crew and cargo has been of inestimable value.

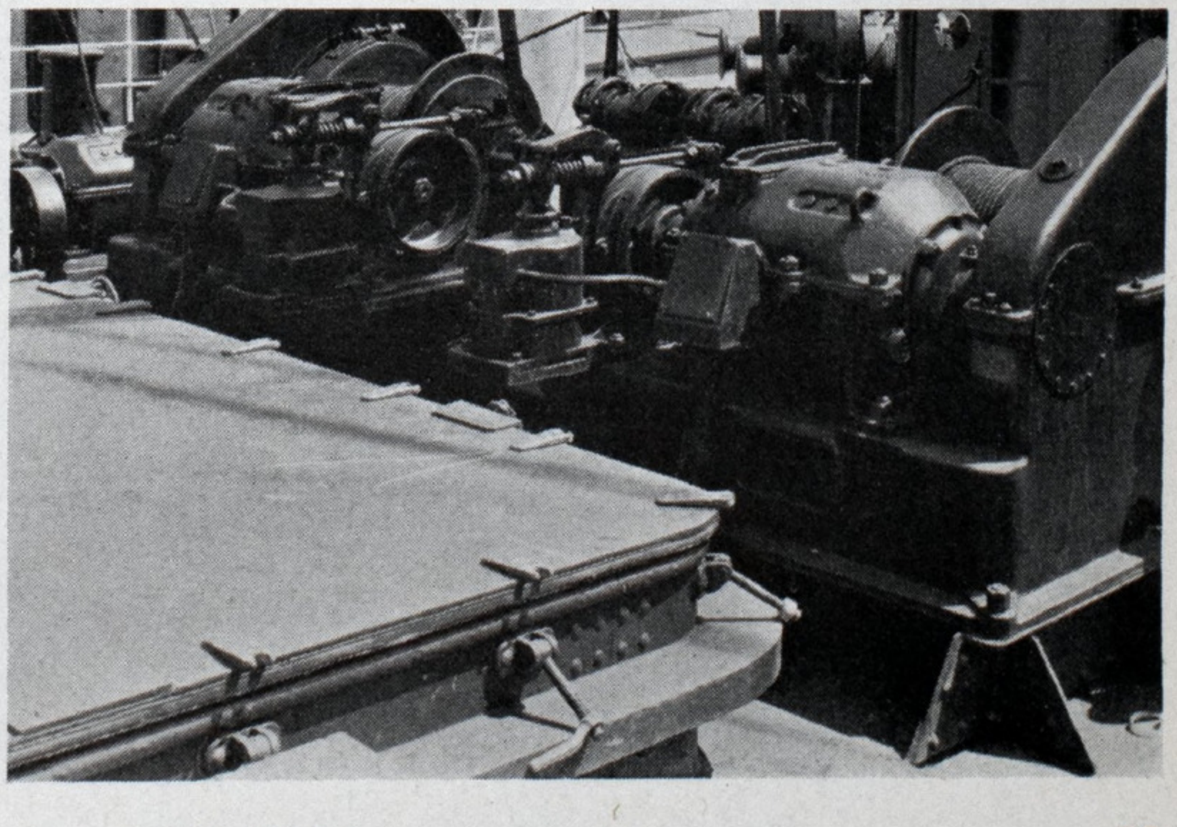


Patented steel gastight cover for 30-foot Hatch on the S.S. Taraqqi known as the "Macanking" steel Hatch cover designed by MacGregor & King Ltd.

Awarded Willans Medal

Francis Hodgkinson, consulting engineer of the Westinghouse Electric & Mfg. Co., and an authority on steam turbines and marine machinery, has been awarded the Willans premium, a distinguished British engineering honor, by the Institution of Mechanical Engineers of London. Mr. Hodgkinson has been notified that the award, given for the best paper published in the proceedings of the institute from 1925 to 1930, inclusive, is being forwarded him from London in the form of a gold medal, following a recent general meeting of the institute. The paper on which the award was made was entitled "Journal Bearing Practice."

The author was born in London in 1867 and was associated with the late Sir Charles A. Parsons in his early experiments with turbines in England.



Steel hatch cover on new American freight and passenger steamer. This cover is of more or less conventional shipyard design with holding down bolts and rubber gaskets for watertightness

No Hand Trucks Used in Three Years

Mechanical Equipment Serves Every Purpose at Lower Cost— All Kinds of Cargo Efficiently Handled Under All Conditions

By H. E. Stocker

FOR the past three years the American South African line has loaded all of its ships leaving New York harbor without any hand trucks being used. The equipment replacing the hand trucks consists of electrically driven lift trucks with crane attachments of various types and capacities.

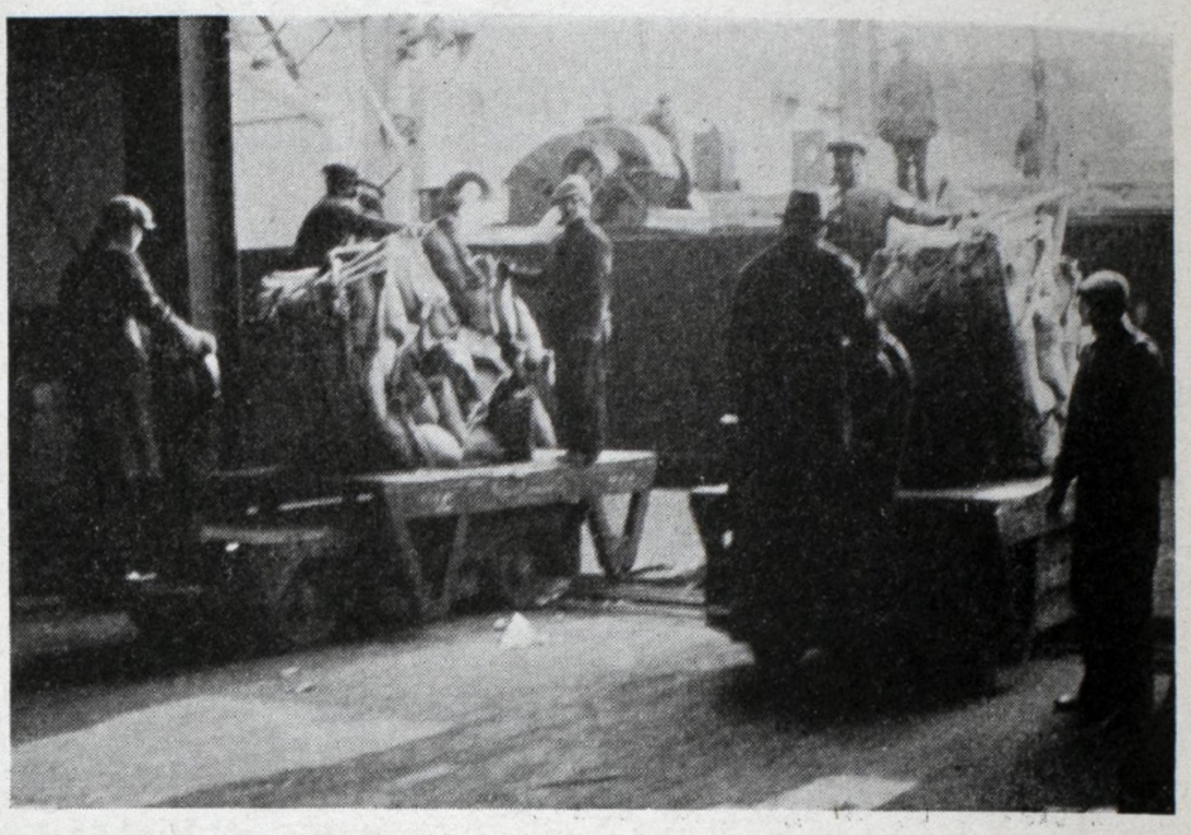
The ship loading operations are performed at the foot of Twenty-ninth street in Brooklyn, N. Y., and the equipment generally used is an electric lift truck with crane attachment. The cranes are automatically clamped to the frame of the truck when elevated by the four jack lifts of the lift truck. Thus there is no tendency to tip in any direction when carrying heavy loads at the high speeds attainable with these trucks. The capacity of the crane attachment is 3500 pounds. For heavier loads, a crane is used which is a crane all the time, having a capacity of 6000 pounds.

For bulk materials in bags, such as refined sugar, the lift trucks are used with platforms instead of with the crane attachments. The change from crane attachment to lift platform can be made in less than ten seconds so that a great versatility is attained for handling the different types of cargo necessary to give proper stowage inside the ship. The platforms used are large enough to hold three one-ton drafts. In the case of refined sugar, each draft will contain 20 bags and the platform load 60 bags.

Equipment Suited to Conditions

The trucks and attachments are obtained by the steamship company on a rental basis so that the selection of the type of equipment is changed as loading conditions make advisable. As only one ship per month leaves New York, renting the equipment keeps it from being idle during the three-week interval in which there are no ships to load. The loading operation is usually performed during the last week of each month and the cargo as it comes in on motor trucks daily varies considerably in quantity. Thus by renting the truck equipment, a sufficient quantity for the daily needs is ordered and there is no excess equipment at any time.

The most common unit of truck equipment is the four-wheel drive, four-wheel steering, rubber tired lift truck. The crane attachments for this truck are of two types. The older type has a stiff leg boom which is not moved, while the newer type has a topping lift and a 6-foot telescopic extension on the boom. The four-wheel steering gives good maneuverability in restricted places on the pier which is an important feature. As the trucks can run equally well in either direction, there is no delay when work is performed in dead end alleys.



Separable platforms used with electric trucks to transfer sugar across pier from two hatches of discharging ship to three hatches of loading ship

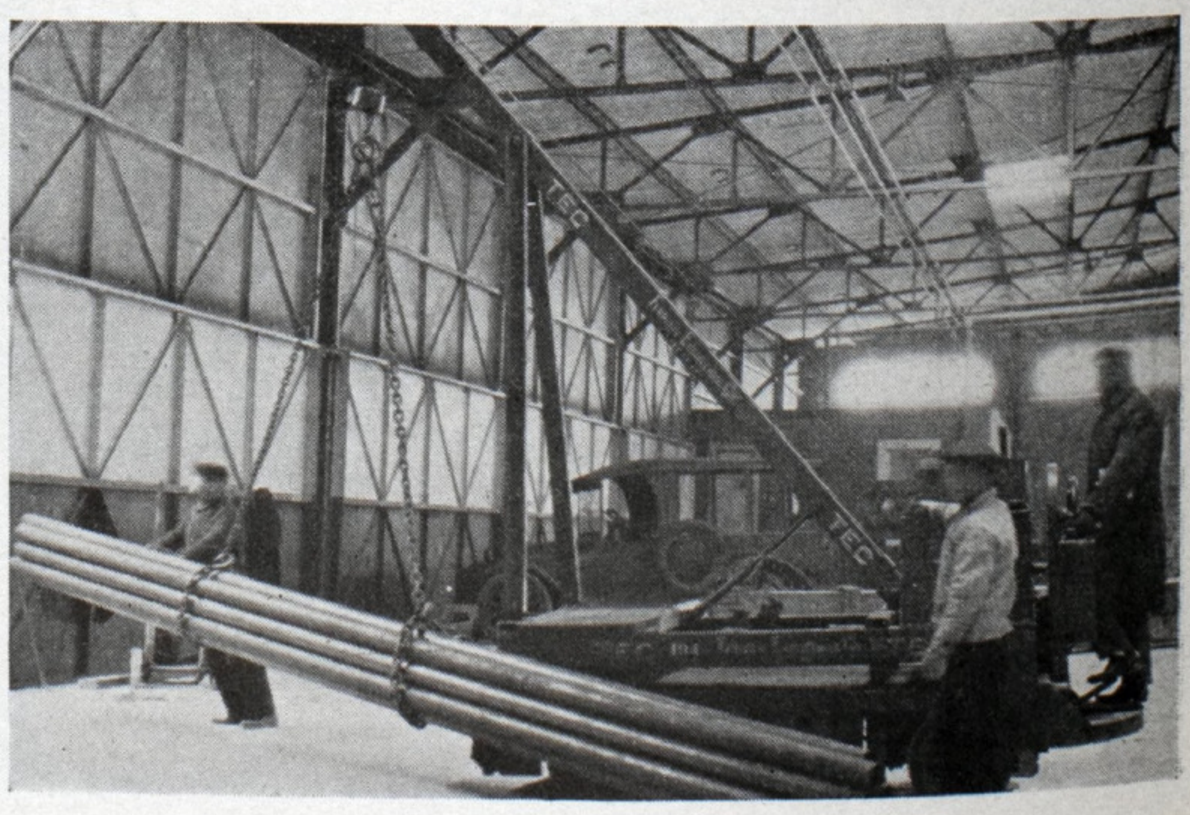
The turning radius of these trucks is a remarkable feature because it enables handling the cargo much easier in crowded quarters. The lift type of truck will turn in a 6 feet 8 inch radius, while the three ton crane truck has a turning radius of only 6 feet 6 inches.

An interesting job was recently performed with these trucks in the handling of a partial cargo of refined sugar which had been brought to New York on another ship which was docked on the north side of the pier. This sugar was loaded into the M. S. City of New York on her maiden voyage. The sugar was discharged from two hatches of one ship and landed on the lift-platforms mentioned above. One truck per hatch handled these platforms and took them to three hatches of the American South African line ship. Nine hundred tons were carried across the pier by the two trucks in about eight hours and when this operation was finished the trucks, as they were knocked off the sugar, picked up crane attachments and began handling general cargo.

Portable Crane Equipment

By using portable crane equipment on a pier, it is possible to keep the aisles relatively clear of traffic because there are no hand trucks working on any hatches. All drafts are made up at the pile on the pier. Slings of various types are simply laid on the floor and the freight rolled or toppled into the slings. Thus there is no lifting required. An added advantage in this method of using slings and cranes is that no extra equipment is necessary aside from that which goes inside the ship with each draft.

Boxed automobiles, with the ex-



Freight being loaded is made up into drafts at the pile and carried to ship's side by electric cranes. Hand trucks have not been used on this pier for the past three years

ception of Fords, are lifted with the cranes so that a dolly can be placed underneath. The load is then pulled to ship side by the crane trucks. An important point in this operation is that the coupling between the truck and dolly is at the same end of the truck as the hook on the crane. Therefore after the box has been lifted it is not necessary to turn the truck around to couple up with the dolly. On crowded piers a long run up to 100 feet might be necessary to find room for turning and this coupling feature of the trucks used by the American South African line saves much time.

Fords are picked up by the three ton cranes and carried on the hook to ship's side without the aid of a dolly. This method however is not feasible if the pier is very full of freight because of the narrow aisles, in which the dolly system would be much faster.

Platform slings are used in handling small cases. The drafts are made up on the floor at the pile and are picked up by the cranes. Spreaders are used to keep the cases from falling from the platform sling while being transported to ship's side.

Net Slings are Used

Net slings are used in handling various commodities, especially barbed wire. When using hand trucks, it is only possible to put three reels of barbed wire on each truck, but with net slings it is possible to put as many as 52 reels on one draft making the draft up at the pile rather than at ship's side. These drafts are then picked up by the cranes and taken to the proper hatch.

Rope slings are used more extensively with this crane operation than any other type of sling. Large cases of various shapes and sizes are most easily handled by carrying them on the crane hook. When carried on hand trucks, it is difficult to take them through narrow aisles, but hanging from the hook of a crane they can easily be swung so as to pass through quite readily.

The American South African line

Type of lift truck used by American-South African line interchanges between platform bodies and crane attachment. It takes but a few seconds to drop the platform body and engage the crane attachment

ships load for six ports, therefore, must have their stowage arranged carefully to facilitate discharging at the other end of the run. It has been found advantageous to place many lighters on the opposite side of the pier rather than off shore so that the material on the lighters can be worked to any hatch in the entire ship. The same electric crane trucks are used for taking the material from the lighters to ship's side. By using the topping lift type of crane or crane attachment it is possible to take the cargo from the lighters with no difficulties due to tide levels. The drafts are made up on the lighter and are then pulled by the crane, which is at the stringpiece of the pier to a position where the draft can be lifted. The crane then carries the draft to the proper hatch of the ship. As many as three lighters are worked at one time by these crane trucks.

It has been found, over a period of years, that one truck per hatch is ample to move the freight as fast as it can be stowed. In many cases the drafts are accumulated ahead of the ship's hook in the pier doorway. By accumulating several drafts ahead when running on short hauls, the truck can make longer hauls without keeping the ship's hook hanging. These complete drafts in slings which are accumulated in the doorway are lifted with the ship's tackle without the difficulties often encountered when auxiliary gear is used. The drafts in the slings can be placed side by side or even two rows deep and still be taken aboard without the draft falling apart.

Some advantages which the American South African line has found in the use of power equipment are outlined above. In addition, there is the decreased cost per ton and the speeding up of the operation until there is now practically no over time work. The electric trucks enable making long hauls from any portion of the pier to ship's side with much greater speed than is possible with hand trucks, and it is possible to get close stowage of the cargo inside the ship by its proper selection from any portion of the pier or lighters.

The pier in spite of its narrowness is remarkably free from congestion because there are no hand trucks used and also because motor trucks can now come in and leave their loads at any convenient place. The motor trucks thus are quickly unloaded and get off the pier and they do not have to wait for a chance to unload at one specific point to be near any hatch.

This type of 3-ton capacity electric crane with telescope boom handles freight from deck of lighters and transfers drafts to any one of several hatches at low cost

Breaks Speed Record

The Canadian Pacific liner EMPRESS OF JAPAN arrived at Vancouver on Feb. 21 with a new trans-Pacific record. Arriving exactly eight days three hours and 18 minutes after leaving Yokohama, the new liner clipped three hours and 40 minutes off her previous record, established last summer. Although the EMPRESS OF JAPAN has been in service less than a year, she has twice broken the record between Yokohama and Vancouver and has established new fast speeds between Vancouver and Honolulu and Honolulu and the Orient.

Passage of the Copeland-Parker bill at Washington on Feb. 27 for 24-hour inspection service at the New York quarantine station will eliminate the present inadequate system of "sunrise to sunset" inspection.

The bill was introduced at the request of the New York port authority to improve conditions.

Personal Sketches of Marine Men

William H. Todd, President, Todd Shipyards Corp.

By Ben K. Price

BEGINNING as a boilermaker's apprentice he now heads one of the world's largest ship repair and shipbuilding organizations.

EXPANSION of his affairs is based on a constant effort to provide facilities always ahead of immediate demands.

HIS outstanding business foresight is paralleled by an unusually close and human relationship with his co-workers.

MORE than 52 years in the shipbuilding industry, beginning as boilermaker's apprentice and rising to the head of one of the largest shipbuilding and repair organizations in the country, an inventor and philanthropist, William Henry Todd is an outstanding figure in the marine world.

Born in Wilmington, Del., Nov. 27, 1864, the son of a shipyard foreman, William H. Todd attended school in that city, leaving at the age of 13 to become newsboy on a Philadelphia-Baltimore train. A year later he was at work under his father at the Pusey & Jones shipyard in Wilmington, beginning as a boilermaker's apprentice. Advancing in turn to riveter, ship fitter, molder and master mechanic, he became at the age of 22 years, assistant foreman of the yard. He was in direct charge of the construction of the yacht VOLUNTEER, which later was to win for America an international cup race. This work was completed in the record time of one month, from the laying of the keel.

Four years later he became master ship fitter in the Brooklyn navy yard, winning this position in a competitive examination from close to 100 contestants. After four years, in the navy yard, in 1895, he went to work for the John N. Robins Co., Brooklyn, N. Y., as iron workers' foreman. He became assistant plant superintendent and three years later vice president and general manager. Upon Mr. Robins' retirement in 1909, Mr. Todd became president. He was then 45 years old.

In 1911 the Robins Dry Dock & Repair Co. was organized to succeed the John N. Robins Co., with the Clyde interests in control. Four years later the company was offered for sale by Mr. Clyde to an English purchaser for $7,000,000. Balking the proceedings, he offered to buy the company for the same amount. Taking with him 100 of his fellow workers, he formed the William H. Todd Corp. and finally consummated a deal for the property with a long installment schedule of payment.

In 1916, Mr. Todd formed a new company, the Todd Shipyards Corp., and took over the Tietjen & Lang Dry Dock Co., Hoboken, N. J.; the Seattle Dry Dock & Construction Co., Seattle, Wash.; and the Quintard Iron Works, New York. The 100 partners received a substantial cash dividend out of this reorganization, and one and a half times their holdings of stock in the old company.

The Todd Shipyards Corp. proved a success from the start. During the World war, with its various yards expanded, it was a leader in the production of ship tonnage. Early in 1917 Mr. Todd closed contract with the United States navy for three scout cruisers of 7100 tons for construction at the Seattle yards.

That same year Mr. Todd also formed the Todd Dry Dock & Construction Corp. and built a large plant at Tacoma, Wash. So rapidly was the plant constructed and put into operation that by the end of 1918 it had launched nine 7500-ton freighters, eight of which were for the government. Selling the Seattle plant to the United States government, Mr. Todd acquired another site nearby for the erection of a ship repair plant equipped with two floating dry docks of 12,000 tons and one of 2000. At the various Todd yards more than 17,000 men were employed at one time during the war.

Since then other plants have been added, including the Todd Shipbuilding & Dry Dock Co., Mobile, Ala., and the Todd Engineering Dry Dock & Repair Co., New Orleans. In 1929 the company opened what was said to be the largest privately owned graving dock in the New York district at the Robins plant in Brooklyn.

Mr. Todd has contributed much to the development of equipment for the burning of fuel oil and is the head of the Todd Oil Burning Engineering Corp. Recently he has perfected machinery for the burning of pulverized coal.

In addition to his own companies, Mr. Todd has numerous other affiliations, both business and social. About 75 per cent of employers of the Todd companies are also stockholders.

In recognition of his achievements, Manhattan college, New York City, conferred upon him in 1920 the honorary degree of LL.D. Commenting on Mr. Todd as a leader in industry, Charles M. Schwab, chairman of the Bethlehem Steel Corp., once said: "Todd is a human dynamo, a man among men, who does things and whose life is a record of achievement."

Useful Hints on Cargo Handling

THIS page is to be devoted to short items on all matters having to do with the more efficient turn-around of ships. These items are intended to be of a helpful nature.

We will welcome for this page brief descriptions, illustrated if possible, of any better or safer way of performing any function in cargo handling. Also, any questions submitted will be answered by the editor.

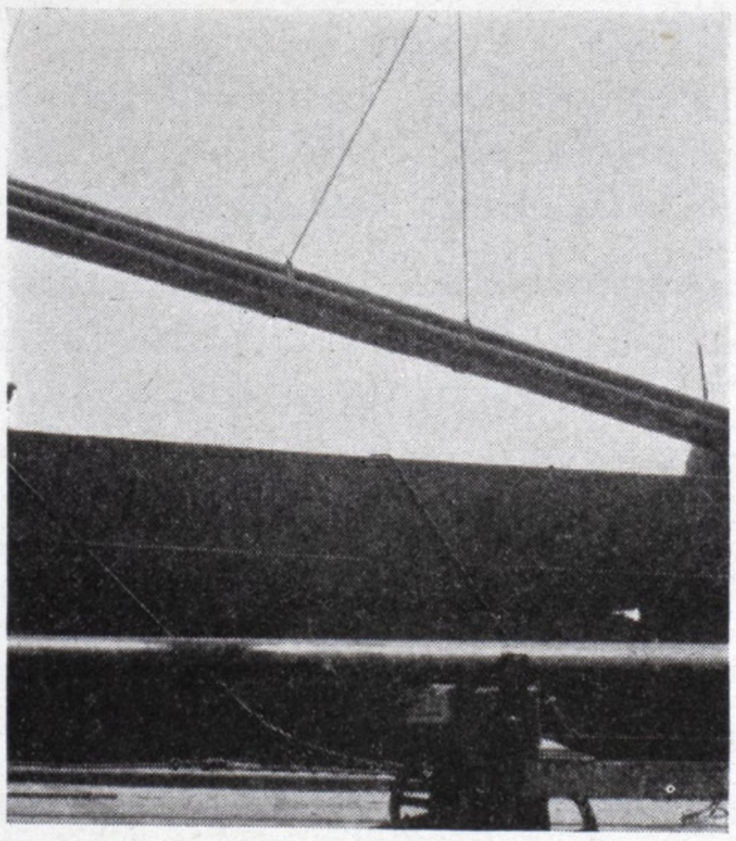
AS HAS so frequently been the case in handling dry, dusty materials such as paper-maker's clay, cement, crushed lime, etc., the means for eliminating dust and other losses in the handling were found in the use of the pneumatic system. The hand loading and the belt conveyor at the storage shed have been replaced by a pneumatic conveyor which reclaims the potash and delivers it to a box car loader. The unloading equipment consists of a flat car upon which is mounted a complete pneumatic conveyor system and filters, with a bucket elevator, and a telescoping spout reaching into the hold of the ship.

The pneumatic equipment is of the usual type modified so that if necessary it can pass under railroad bridges for removal to other plants. In this event, the bucket elevator must be dismantled on account of its height.

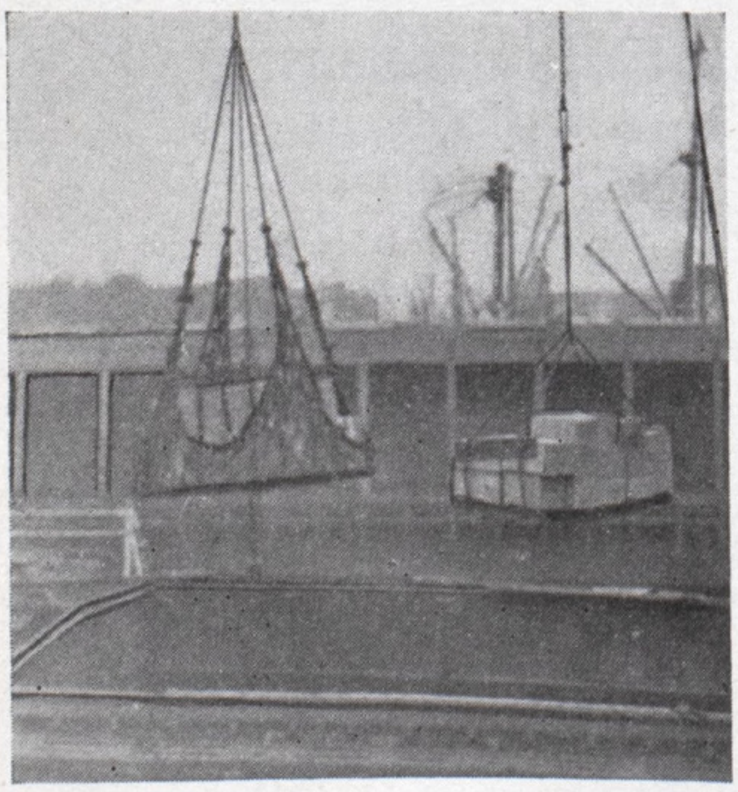
In this part of the installation, there is a receiver, three compartments of filters, a screw conveyor discharging into the boot of a bucket elevator, and a motor driven vacuum pump. A long, telescopic chute extends from the head of the elevator to the hold of the vessel, which is loaded by gravity.

The same essential parts are used here, as in the car loading installation, with the exception that the long conveyor duct is not required. Instead, there are two sections of flexible hose with suction nozzles for unloading cars.

Material is drawn from a box car spotted alongside the conveyor, and after passing through the receiver and filters, the air is exhausted through the pump, into the atmosphere. The vacuum pump, with a 75 horsepower motor, is housed at one end of the flat car; the filters are at the opposite end. A car puller at the end of the dock is used for spotting the cars and in operation the ship to be loaded is moored at the dock, adjacent to the movable conveyor. Hand manipulation of the two intake nozzles inside of the car permits unloading at the rate of 15 to 20 tons per hour, with five men to handle the equipment. Six men were required with the former method of unloading.



Handling Pipe at Los Angeles



By Doubling Up Gangs the Ship's Dispatch Can Be Expedited

On Using Gantry Cranes

The East Chicago Dock Terminal Co. using gantry cranes load random lengths of steel at an average of 60 tons per gang hour. The slingloads range from 3 to 8 tons. Pig iron is handled at the rate of 100 tons an hour in 16 slingloads. Hatches of the ships using the terminal vary from 12 feet to 60 feet fore and aft and 18 feet to 24 feet wide. With the smaller hatches operations are retarded approximately 10 per cent.

Recently a well known steamship company discharged a partial cargo of newsprint paper from hatch No. 2 onto the pier and stored it three high with an electric truck fitted with paper handling attachment. Hatch No. 3 was handling the same commodity but using hand methods on the pier. The electric truck handled 74 rolls an hour. The gang on hatch No. 3 handled only 28 rolls an hour and could only stack them one high on end.

Wood Outlasts Steel

WOOD still plays an important part in many marine structures including steel ships. This applies particularly to docks and piers of all kinds and for foundations and other parts of structures built over water or on shore in contact with water. For such work the most durable timber is obviously the best. However, many conditions enter into the availability of the best material and very often a compromise is made on account of cost and difficulty of procurement. As a result the upkeep cost is high.

Perhaps no other commercial timber has the remarkable lasting qualities of mature greenheart wood. It has been known a long time having first come to the attention of English timber merchants in 1769. From then on it was imported in large quantities first to England and later to the United States. The chief source of supply is British Guiana. According to government experts, though greenheart is well known, its importance in the timber trade of this country promises to increase since no other foreign wood is so well adapted to so many uses.

Driving Greenhart Piling for Durability and Strength. Remarkable Lasting Properties

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

AN UNDERSTANDING that the terms of an undertaking exonerated a tug owner from responsibility for any accident resulting from putting a barge in place cannot exonerate such owner from the responsibility of a mishap resulting, not primarily from the conditions over which he had no control, but from the faulty carrying out of the undertaking assumed.—VIM, 40 F. (2d) 638.

* * *

WHILST it is settled law that, as between the right of traffic over a drawbridge or swinging bridge crossing navigable waters of the United States and the right of navigation through those waters, the right of navigation is the paramount right, and must not be unreasonably obstructed by delay in opening the bridge, the rights are necessarily, to a large extent, correlative, it was stated in the case of Newtown Creek Towing Co. v. City of New York, 40 (2d) 649, and a vessel using the waters and desiring to pass through the bridge should not only signal in timely fashion to the bridge, but should approach it at such speed as, under the tidal and other conditions then existing, will give the bridge time to open.

* * *

MERE contact between two ships, when a ship in tow was entering a slip, does not of itself establish negligence of the tug.—OTSEGO, 40 F. (2d) 925.

* * *

DAMAGES to be recovered from party at fault for a collision shall be sufficient to restore the injured vessel to the condition in which she was at the time the collision occurred. This damage is not affected by the fact that temporary repairs were made, and it can be proven by expert testimony, although the work is never actually done.—B. F. GUINAN, 40 F. (2d) 277.

* * *

A NIGHT watchman, transported to a scow on a tug under contract, was not a passenger, but he was entitled to reasonably safe means for leaving the tug at the place where he was to work.—ROSS CODDINGTON, 40 F. (2d) 280.

* * *

IN THE case of Bellaire, Benwood & Wheeling Ferry Co. v. Interstate Bridge Co., 40 F. (2d) 323, it was held: "The power of congress to regulate the use of navigable waters is unquestioned. * * Likewise the power of congress over navigation is supreme. The courts will take judicial notice * * of the fact that bridges cannot be constructed over navigable streams except by the authorization of congress. * * The Ohio river is a navigable stream."

* * *

IN THE case of St. Louis Coke & Iron Co. v. Goltra, 41 F. (2d) 134, it appeared that the company contracted for transporting 10,000 tons of coal by barges, which contract was entered into in view of labor troubles and a strike of railroad switchmen, and that the company's needs were not fully supplied by cars, and that is assigned as reason for not loading barges that the coal was not forthcoming owing to lack of an understanding with the coal company. The carrier incurred large expense in assembling and manning barges and transporting them for loading. The court held that, under the circumstances, the company owed a duty of utmost good faith not to purposely defeat the transportation of coal, and that the company was liable for damages for failure to furnish coal for transportation. It was also decided that a breach by the carrier in failing to have barges in place for loading in time was waived by the shipper by inducing the carrier to remain after the arrival of the barges, pending negotiations for coal delivery.

* * *

WHERE persons on a tug in the Houston ship channel did not hear fog signals blown by a vessel proceeding down the channel, the presumption may be indulged, said the court in the case of LUTCHER BROWN, 41 F. (2d) 176, that such persons were not attending strictly to their duties.

* * *

WHERE a fuel tank of a vessel had been subjected to two Lloyd's surveys within preceding two years, the owners of the vessel, it was declared in the case of E. I. Dupont De Nemours & Co., Inc., v. American Hawaiian Steamship Co., 41 F. (2d) 226, cannot be held to be bound to apply a pressure test to all fuel tanks of the vessel prior to commencement of a voyage, in the absence of facts putting them on notice of leakage.

* * *

THE charterer is liable for any damage to the boat resulting from his own negligence or the negligence of any one to whom he intrusts her. The burden of proving negligence is upon the owner, but he makes out a prima facie case if he can go no further than to show that the boat was damaged during the charter period, and then the burden of explanation, or, as it is sometimes said, of carrying on, lies upon the charterer. In the absence of exculpatory evidence a presumption of negligence arises against him. This is the established law as to the obligation of the bailee in bailments for hire.—MORAN No. 10, 41 F. (2d) 255.

* * *

IN ADMIRALTY the rule is well settled, said the court in the case of Puget Sound Navigation Co. v. Nelson, 41 F. (2d) 356, that a vessel committing a breach of statutory duty must not only show that probably her fault did not contribute to the disaster, but that it could not have done so. It was also pointed out by the court that the doctrine in admiralty of an equal division of damages in the case of a collison between two vessels, when both are in fault contributing to the collision, has long prevailed in England and this country. But at common law the general rule is that, if both vessels are culpable in respect of faults operating directly and for injuries so caused.

* * *

WHILE it is of course true that a vessel must furnish a safe place in which workmen are required to perform their services and also a reasonably safe passage to and from such place, nevertheless, when it has employed an independent contractor to load and stow the cargo, and has turned the ship over to the contractor in a safe condition, then it is relieved of any fault that may arise through the work of the servants of the contractor; the rule being that a vessel in charge of stevedores or independent contractors is not liable in admiralty to such stevedores or independent contractors, or to their employes, for injuries, unless a contractual relation exists between the vessel and the person injured, or on account of the failure on the part of the owner, or those in charge of the navigation of the vessel, to perform maritime duty or obligation, as a result of which injuries are received.—Long v. Silver line, Ltd., 41 F. (2d) 367.

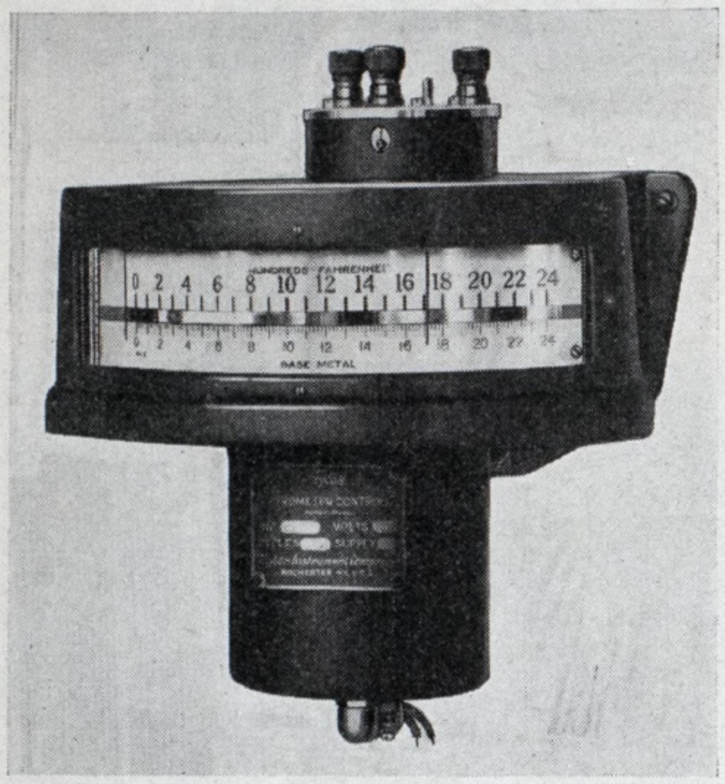
* * *

IN THE case of AUGUSTA W. SNOW, 41 F. (2d) 377, it was brought out that a contract for the sale of a vessel was drawn without the assistance of legal advice and that stipulations in such contract should be given a meaning which would have the effect of denying to the purchaser the right to suffer or permit a lien. The court held that the fact that the contract was drawn by a layman would not justify the court in giving a strained and unnatural meaning to the clear language of the contract, and it was decided that such contract did not withhold from the purchaser the right to incur liens on the vessel.

Equipment Used Afloat and Ashore

Redesigned Pyrometer Control—Portable Electric Saw, Three Sizes—Employ New Method of Welding Rotors—New Welding Blowpipe—Preformed Wire Rope

THE redesigned pyrometer control made by the Taylor Instrument Co., Rochester, N. Y. and shown in the accompanying illustration embodies several new features and improvements. The weight of the instrument has been decreased three pounds and the back panel has been eliminated. This simplifies wiring and makes the instrument easier to install or take down. Simplicity of design and total absence of vibration or shock of any kind in the operating mechanism insure dependability and long life for this pyrometer control.



Tycos Indicating Pyrometer Control

Portable Electric Saw Increases Production

THE VAN DORN ELECTRIC TOOL CO. of Cleveland announces, as an addition to their line, three sizes of portable electric saws, the 6-inch, 8-inch and 10-inch, the size representing the diameter of the circular saw blade that is used. They have been developed to increase production sawing of all kinds of wood and with the use of an abrasive disc to cut slate, marble, asbestos, transite, tile, porcelain, etc.

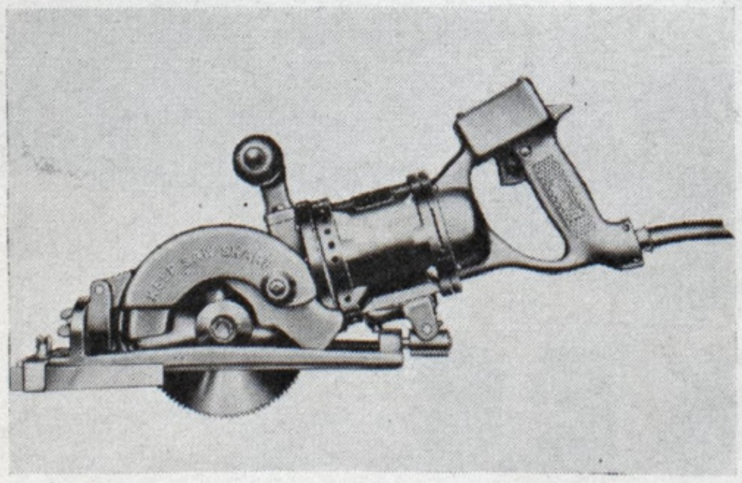
These saws are driven by Universal motors operating on alternating and direct current and conform to the most modern safety practices, incorporating an automatic safety switch and automatic telescopic guard.

The safety switch starts the saw when the trigger is pulled, but cuts off the current the instant the trigger is released, while the telescopic guard automatically opens as the saw enters the work and closes over the blade when the cut is finished, affording the utmost protection to the operator.

These saws are fully adjustable, having thumb-screw adjustments for regulation of depth of cut, width of cut and a graduated adjustment for beveled cuts.

The depth of cut is adjustable and the maximum depth of the 6-inch size saw is 1¾ inches, 8-inch size, 2½ inches and 10-inch size, 3½ inches.

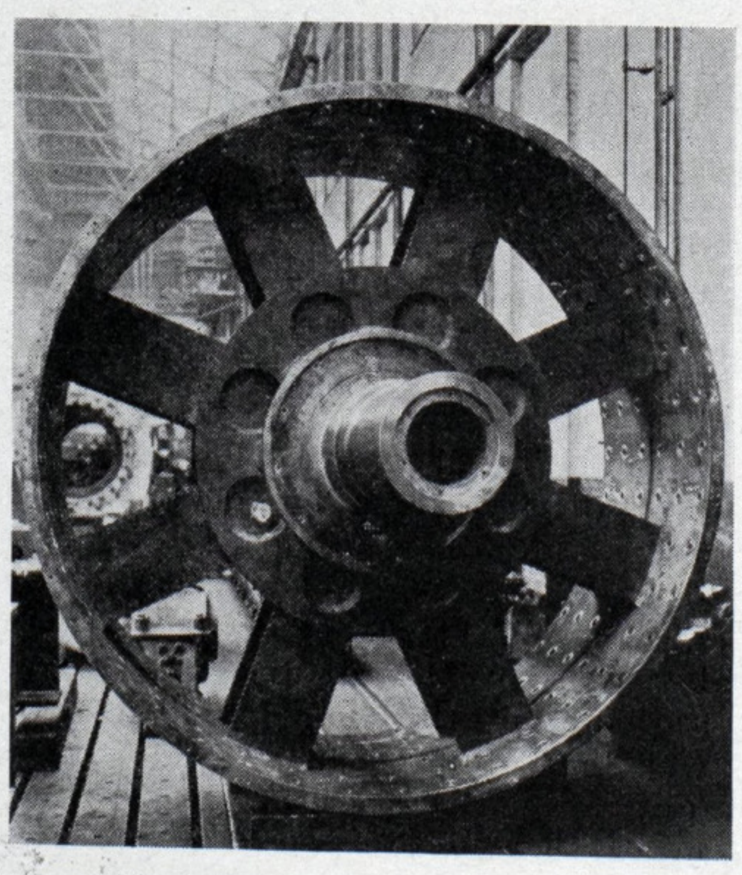
Each saw is packed in a compact case for either shipping or carrying the saw to the job.



Portable Electric Saw is Made in Three Sizes

Employ New Method of Welding Rotors

IN DESIGN the use of welding has progressed to the point where manufacturing methods have taken a place parallel to riveting and castings. The accompanying illustration shows an application where welding is used to obtain maximum efficiency of connections. This particular rotor, 148 inches in diameter, was designed to withstand exceptional vibrational stresses, distributing them uniformly throughout the weld with a minimum of stress concentration in both weld and welded members.

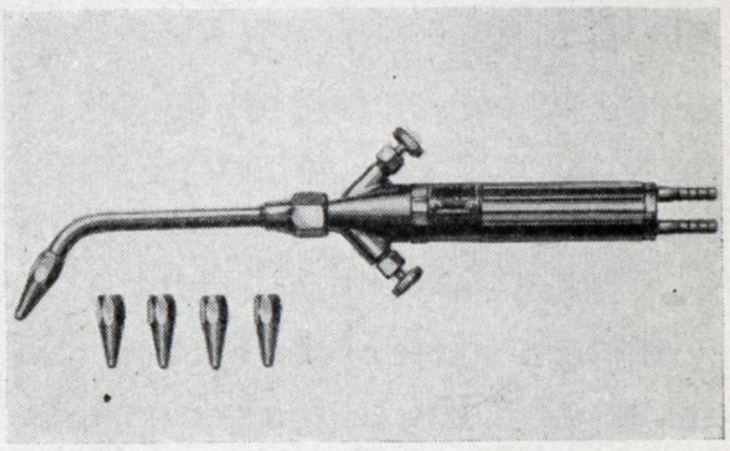


Welded Rotor, 148 inches Diameter, for Ship Propulsion Motor

This rotor is for a ship propulsion motor, rating 13,250 horsepower, 133 revolutions per minute and was made by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

New Welding Blowpipe

THE welding blowpipe illustrated in the illustration below is an improved sheet metal blowpipe designed primarily for airplane fuselage welding although suitable for light welding work of all kinds and operates on the medium pressure principle. The gases mix immediately in front of the handle and the oxygen and acetylene valves are so located that they can be readily adjusted with the thumb and forefinger of the hand which holds the blowpipe. The blowpipe is 10½ inches in length, weighs only 10 ounces and is perfectly balanced. Six different size tips are available although it is furnished as standard with 5 tips, numbers 2 to 6 inclusive.



Prest-O-Weld Type W-107 Welding Blowpipe

The blowpipe is known as type W-107 welding blowpipe and is made by the Linde Air Products Co., 205 East forty-second street, New York.

Make Preformed Wire Rope

The American Chain Co. Inc., in its annual report to its stockholders, has announced that one of its subsidiaries, the American Cable Co., has concluded negotiations with the American Steel and Wire Co., a subsidiary of United States Steel Corp., to manufacture preformed wire rope under a license agreement, the patents covering this material being owned by the American Cable Co.

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	439	2,127,771	484	2,261,468
January	486	2,417,338	542	2,533,711
December	539	2,497,454	521	2,454,917
November	485	2,194,780	470	2,144,883
October	530	2,546,629	548	2,636,414
September	591	2,877,309	556	2,693,493
August	554	2,716,668	586	2,855,323
July	578	2,717,787	616	2,815,336
**June	585	2,722,344	559	2,596,692**
May, 1930	592	2,697,642	643	2,955,826

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	69	200,212	53	163,134
January	70	227,146	49	158,570
December	80	206,778	55	144,471
November	87	226,006	46	122,107
October	85	231,460	53	144,530
September	87	232,781	52	147,365
August	92	244,206	55	144,201
July	96	246,866	68	151,861
**June	92	240,323	72	169,627**
May, 1930	105	271,618	64	143,167

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	76	259,402	57	190,598
January	76	245,382	49	195,091
December	91	287,347	50	174,971
November	77	248,220	61	232,826
October	96	321,092	65	208,695
August	115	305,649	101	299,454
July	152	325,325	110	222,555
**June	152	325,325	110	222,555**
May, 1930	163	362,849	114	274,019

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	18	48,722	15	45,664
January	.....	.....	.....	.....
December	23	55,605	23	60,126
November	21	46,182	20	40,916
October	17	41,667	20	45,989
September	32	53,423	28	49,428
August	36	69,765	36	72,282
July	42	83,987	42	84,939
**June	39	70,119	34	60,536**
May, 1930	31	46,797	33	52,619

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	9	43,707	8	30,036
January	8	28,019	5	15,335
December	9	36,380	6	25,318
November	13	46,927	5	18,597
October	10	37,269	5	22,305
September	6	28,972	3	16,265
August	7	29,532	4	16,388
July	10	36,403	5	19,623
**June	6	26,588	4	18,640**
May, 1930	7	28,953	6	23,794

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	24	95,726	43	175,697
January	29	119,686	47	192,455
December	27	107,300	52	197,628
November	30	122,020	53	208,266
October	40	155,991	54	207,118
September	30	122,022	46	182,641
August	32	125,137	46	174,985
July	30	118,919	53	193,425
**June	31	122,569	48	175,167**
May, 1930	32	122,714	49	179,845

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	99	327,516	106	340,771
January	121	386,924	127	412,306
December	120	390,126	127	429,048
November	116	384,877	117	376,725
October	139	452,905	127	402,155
September	150	475,928	138	424,976
August	130	412,209	125	396,421
July	132	444,823	144	455,226
**June	153	486,645	157	481,837**
May, 1930	152	457,169	150	463,958

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	15	43,123	46	116,116
January	21	57,883	61	170,594
December	44	92,341	63	174,384
November	22	65,716	56	141,242
October	21	72,517	58	153,410
September	21	48,971	66	168,922
August	28	66,765	50	139,710
July	27	63,721	60	144,446
**June	23	52,701	43	109,274**
May, 1930	28	58,214	53	131,768

Jacksonville

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	7	18,934	9	20,915
January	14	28,243	10	15,617
December	17	33,862	16	29,847
November	14	30,105	10	13,048
October	14	27,810	14	27,016
September	12	26,442	13	26,356
August	15	29,565	12	20,856
July	6	14,312	8	20,739
**June	10	25,129	12	23,737**
May, 1930	14	32,001	19	51,210

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	61	70,169	56	69,443
January	61	82,218	57	30,394
December	.....	.....	.....	.....
November	49	63,307	50	64,389
October	50	61,288	49	60,432
September	48	64,968	48	64,742
August	50	61,440	50	61,666
July	56	68,968	55	69,397
**June	57	69,679	56	68,658**
May, 1930	104	120,788	108	120,160

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	93	222,163	86	206,376
January	.....	.....	.....	.....
December	91	208,802	84	194,477
November	106	241,663	99	220,755
October	99	187,035	92	196,893
September	83	184,276	81	171,679
August	102	190,362	96	176,488
July	113	211,989	95	173,549
**June	113	211,446	111	212,639**
May, 1930	98	169,700	106	203,070

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	48	212,187	53	233,121
January	54	238,037	60	266,744
December	56	240,203	61	256,724
November	59	255,728	57	245,592
October	57	246,957	63	272,114
September	62	268,203	58	250,301
August	48	200,602	48	209,109
July	54	248,954	60	261,746
**June	49	215,525	53	228,554**
May, 1930	54	235,178	53	222,715

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	159	499,643	172	537,813
January	207	610,472	190	548,267
December	203	602,527	197	578,723
November	187	555,053	194	541,671
October	218	633,652	228	672,782
September	210	589,459	218	605,239
August	220	600,786	241	666,625
July	270	697,526	245	653,562
**June	233	606,340	239	626,307**
May, 1930	260	686,543	251	662,383

Charleston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net. tonnage	—Clearances— No. ships	Net tonnage
February, 1931	.....	.....	.....	.....
January	.....	.....	.....	.....
December	.....	.....	.....	.....
November	.....	.....	.....	.....
October	.....	.....	.....	.....
September	19	54,863	19	69,530
August	13	34,274	13	24,742
July	25	70,538	25	51,805
June	18	42,196	18	46,140
May, 1930	20	50,484	20	50,484

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	23	40,825	71	209,057
January	25	45,442	84	260,555
December	.....	.....	.....	.....
November	.....	.....	.....	.....
October	.....	.....	.....	.....
September	46	117,185	119	337,091
August	37	82,429	97	277,077
July	40	93,999	83	249,064
**June	28	60,622	63	171,223**
May, 1930	35	59,807	82	240,137

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	181	557,981	196	561,570
January	191	673,620	193	753,720
December	227	654,598	184	596,347
November	219	618,855	206	616,266
October	236	680,430	217	628,733
September	255	697,262	218	616,018
August	211	631,167	221	621,088
July	230	687,670	196	611,768
June, 1930	240	632,188	225	641,270

San Francisco

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	.....	.....	.....	.....
January	165	685,851	172	721,042
December	154	646,767	174	689,358
November	144	570,715	161	656,424
October	151	617,143	154	639,552
September	171	699,832	154	629,577
August	164	670,748	159	653,208
July	166	674,380	166	676,092
**June	154	652,411	134	560,605**
May, 1930	168	709,182	156	625,712

Houston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1931	30	130,544	38	152,347
January	26	111,047	37	140,860
December	35	143,585	47	185,757
November	28	105,541	50	178,538
October	34	136,215	50	182,729
September	32	140,415	62	220,024
August	39	147,462	69	257,365
July	30	120,727	42	158,570
June	47	190,145	45	193,620
May, 1930	41	146,840	47	172,171

Note: The figures given in this table are for direct entrances and clearances. Additional vessels in foreign trade enter and clear from and to other American ports after original entry and before final departure. At the port of Philadelphia, for instance, additional vessels in the foreign trade in this category were 48 of 157,682 net tons entered and 63 of 212,278 net tons cleared for the month of February.

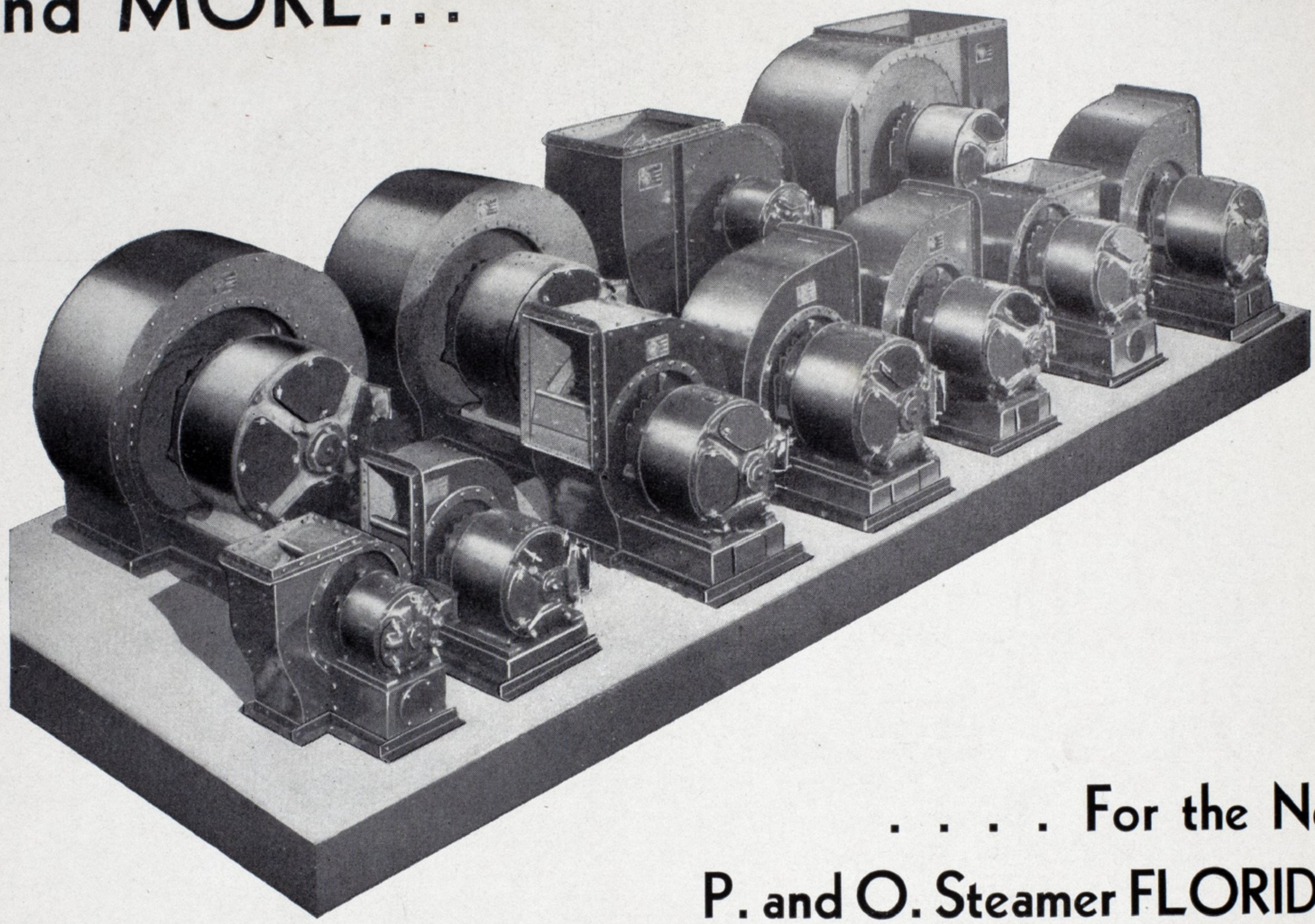
Marine Review

Reg U.S. Pat. Off.

The National Publication Covering the Business of Transportation by Water

April, 1931

THESE—
and MORE...



. . . . For the New
P. and O. Steamer FLORIDA

When completed, this modern passenger steamer now building at Newport News Dry Dock will be almost 100% Diehl motor equipped.

The above illustration shows partial shipment of the ventilating blowers, equipped with Diehl marine type, weatherproof, ball-bearing motors. In addition the installation will include Diehl motors for elevators, machine shop apparatus, galley appliances, pumps, compressors, oil purifiers, etc., and complete fan equipment for staterooms.

The selection of Diehl motors by many American shipbuilders and operators to aid them in carrying out their program of enhanced comfort for ship passengers, testifies to the quality and dependability of Diehl power apparatus.

DIEHL MANUFACTURING COMPANY

Electrical Division of

THE SINGER MANUFACTURING CO.

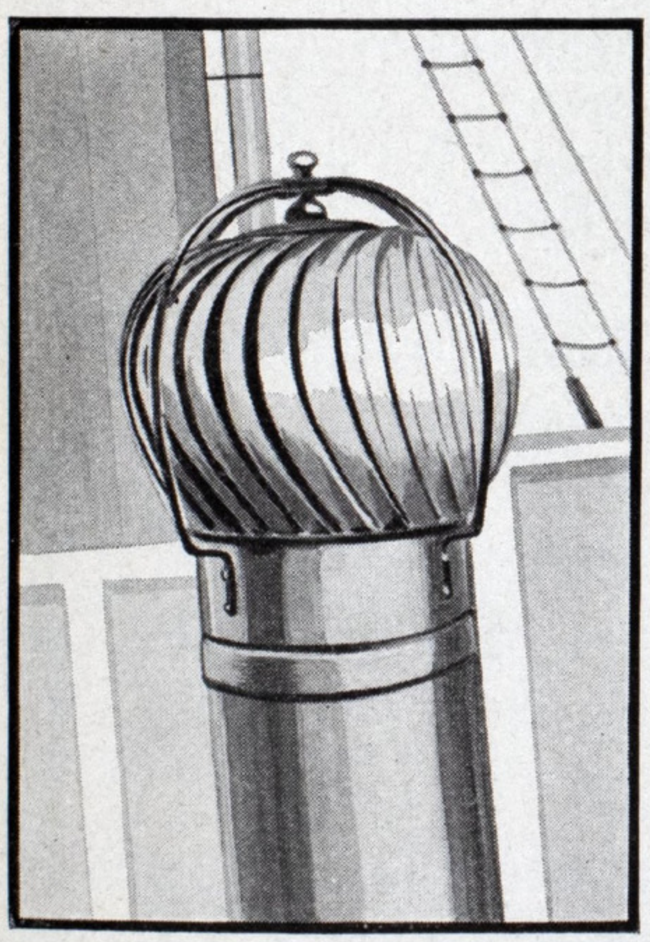
ELIZABETHPORT, N. J.

Atlanta—Boston—Chicago—New York—Philadelphia

DIEHL

Vol. 61, No. 4, April, 1931, issue of MARINE REVIEW, published monthly at Cleveland, O. Entered as second class matter at the post office, Cleveland, Ohio, under the act of March 3, 1879. Subscription price $3.00 a year in U. S.; Canada, $4.00; Great Britain, £1; single copies, 35c.

ADDS DISTINCTION TO VENTILATING EFFICIENCY



Always trimmed and always trim, Allen Turbine Ventilators combine distinctive performance and appearance.

Nor is that all—for Armco "titecote" Galvanized Ingot Iron or Copper combined with Allen advanced engineering and precision construction assure years of trouble free performance.

Cost free operation makes Allen's first cost the only cost—and a moderate one at that—for Allen's tremendous exhausting power means moderate equipment requirements.

It is conspicuous that those ships that provide greatest comfort for passengers—and maximum protection for cargoes—assure thorough ventilation with Allen Turbines.

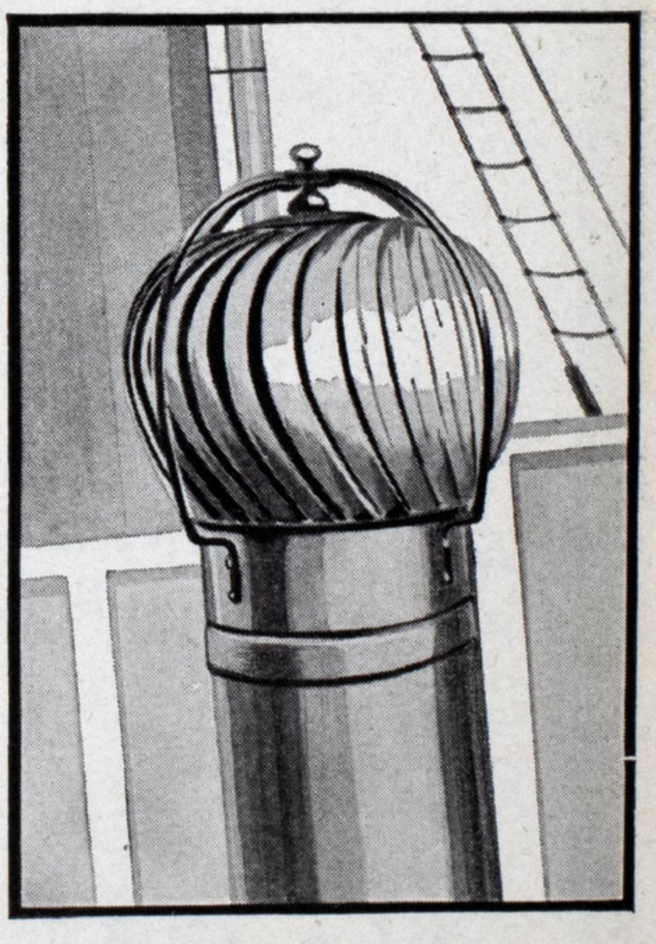
Allen engineers are justly proud of their accomplishments in the marine field. Let them bring their specialized knowledge to your problems—without cost.

THE ALLEN CORPORATION

1049 - 14th Street

Detroit, Michigan

For twenty years Builders of Quality Ventilators.



ALLEN TURBINE VENTILATORS

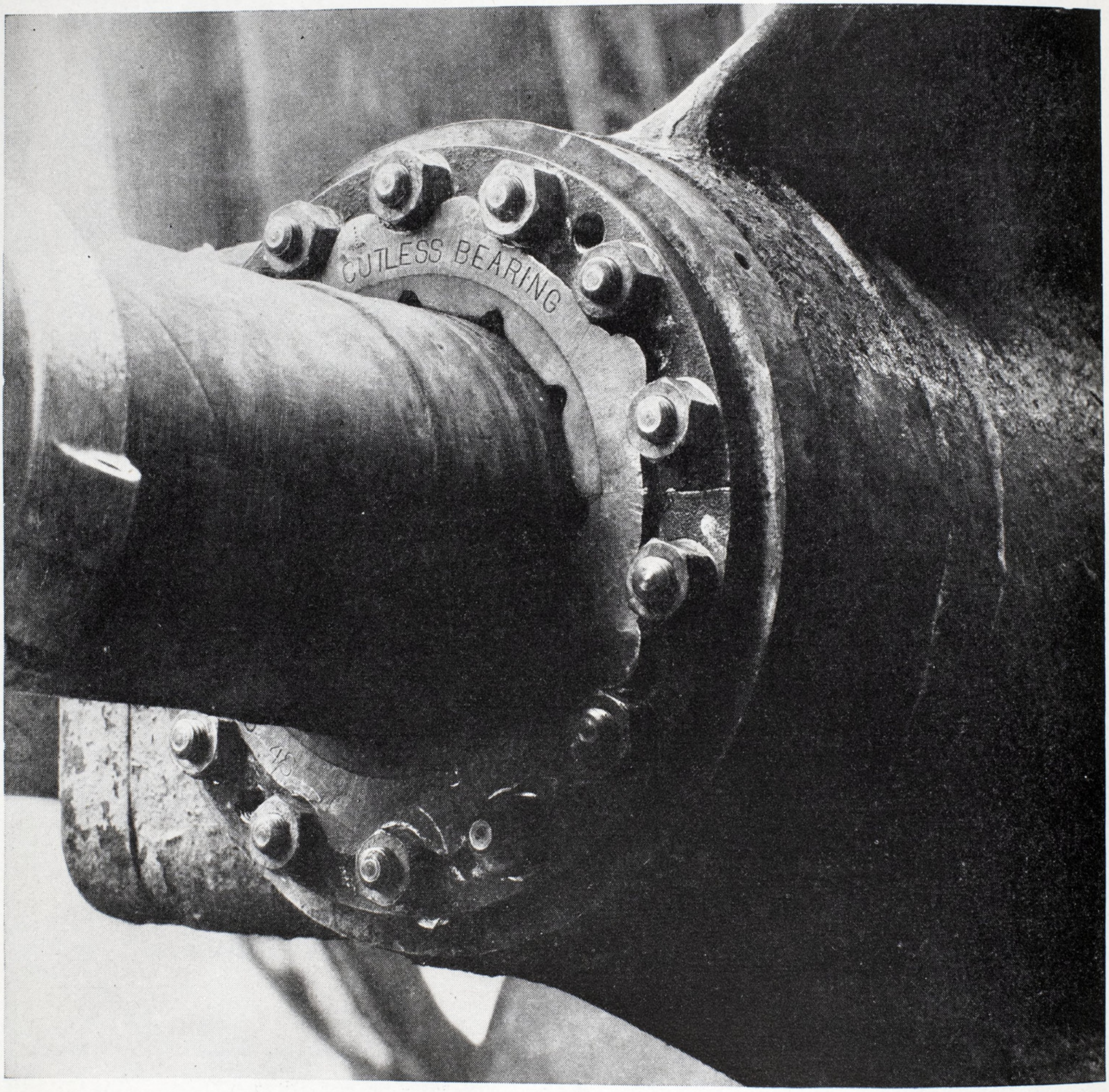
Marine Representatives.

Baltimore, Md., 105 E. Pleasant St.....Plaza 4061
Boston, Mass., 79 Milk St. .....Hancock 4094
Chicago, Ill., 520 N. Michigan Ave.....Whitehall 4700
Cleveland, Ohio, 924 Keith Bldg. .....Superior 1418
Detroit, Mich., 1050 Fourteenth St.....Lafayette 1126
Houston, Texas, 404 Avondale .....Lehigh 4787

Marine Representatives.

Milwaukee, Wisc., 123 Pittsburgh Ave. E.....Broadway 8328
Mobile, Ala., 212 Masonic Bldg. .....Dexter 891
New York, N. Y., 165 Broadway .....Cortland 1590
Philadelphia, Penna., 102 N. Fifth St.....Lombard 7290
San Francisco, California, 525 Market St.....Sutter 1100
Seattle, Washington, 206 First Ave. S.....Main 7260

Three words in the save Thousands



In the above photograph, you will note the words "Cutless Bearing," stamped in the metal sleeve. Directly beneath is the soft rubber lining, with its longitudinal grooves. Sand can not lodge in this rubber surface as it can in a hard-surfaced bearing, but is depressed into the rubber, rolled into the adjacent groove, and washed out by the lubricating water stream.

Goodrich

Specifications of Dollars in Upkeep

Problem of bearing renewal and shaft reclining is solved for marine industry

A BEARING made of *soft rubber!* Perhaps your first though would be that rubber hasn't enough strength for such strenuous service.

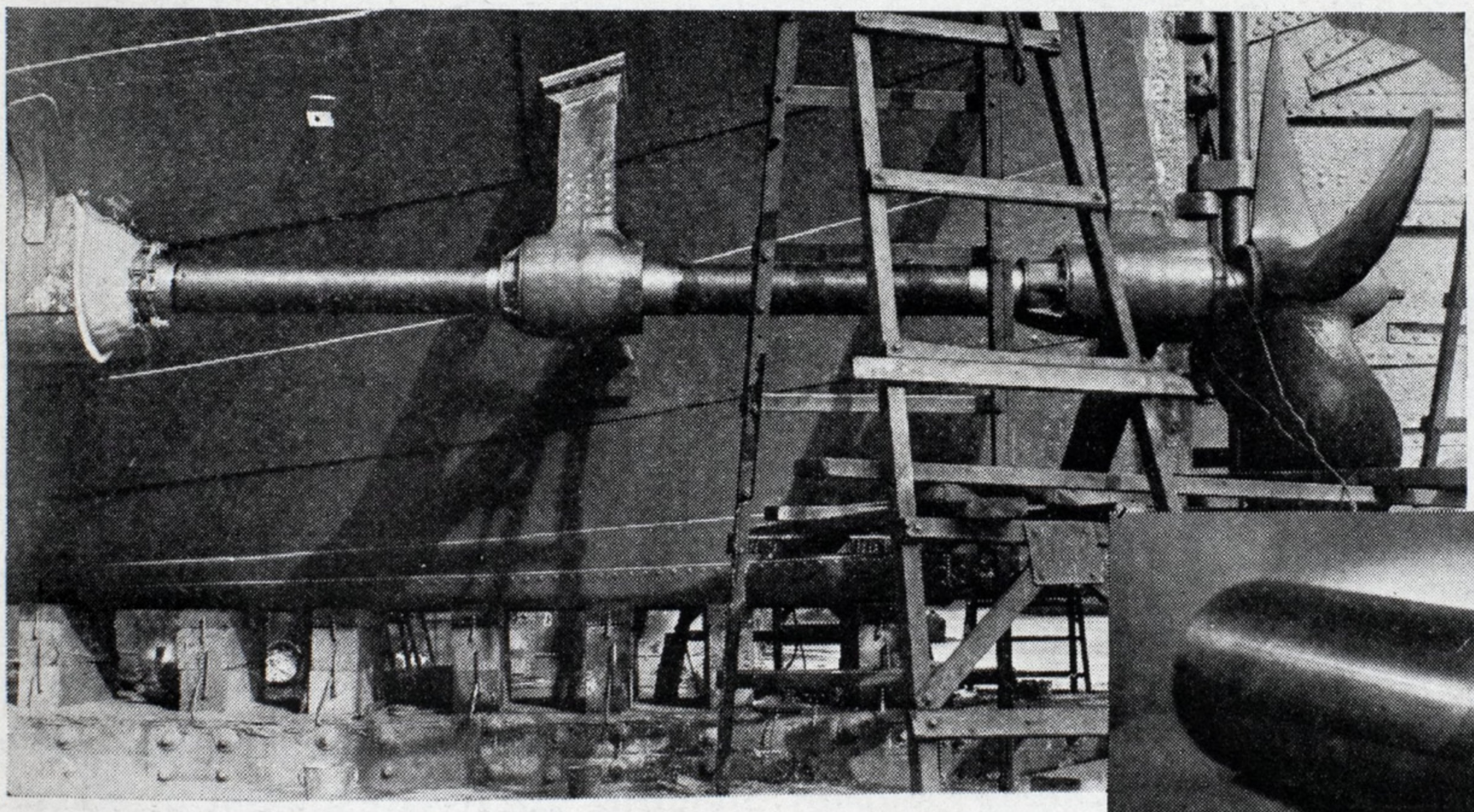
But give the matter a little more thought. Rubber can carry an astonishing load. Everyone has seen a solid truck tire, with only a small part of its surface touching the road, carrying tons of weight, with deflection hardly perceptible.

Everyone has seen a tire spin on a wet street car track. *The coefficient of friction of rubber in contact with metal, when wet, is extremely low.*

We've all seen steel skid chains worn out in a few hundred miles while tires, made of soft, tough rubber, run for many thousands of miles.

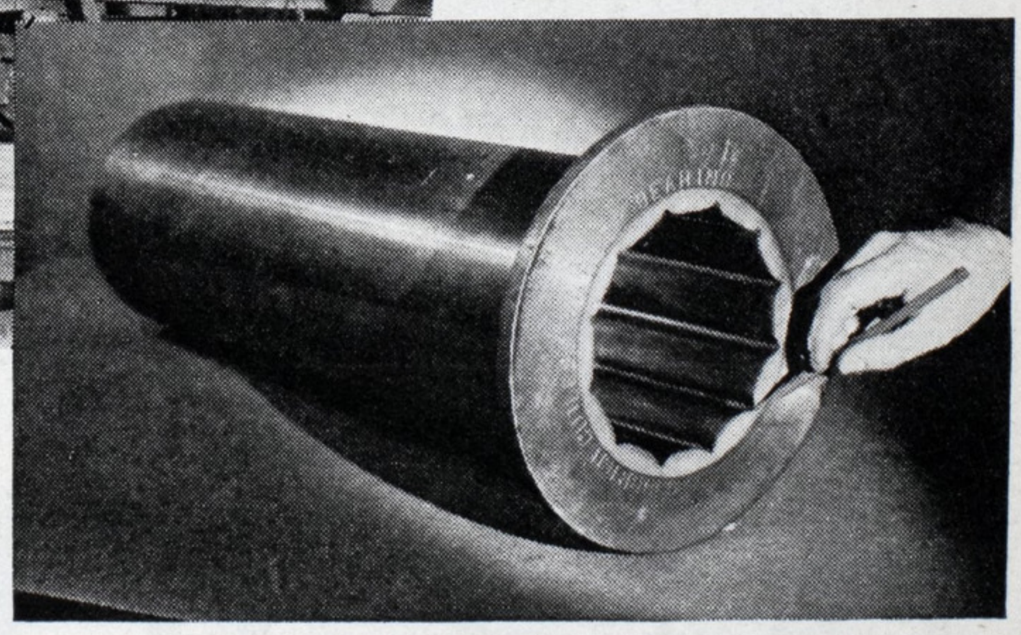
And this long wearing quality of rubber, when compounded in the right way, has been proved again by the Goodrich Cutless bearing. In vessels of every type, freight and passenger steamers, large yachts, dredges, tugs, ferryboats, as well as in small cruisers and runabouts, Goodrich Cutless bearings have demonstrated their economy. In some cases they have outworn all other types previously used by ten or twelve to one!

Three important words in the specifications are "Goodrich Cutless Bearings." Would you like to have further information about them? We have a booklet giving full engineering data which we'll be glad to send. Write to The B. F. Goodrich Rubber Co., (Est. 1870), Akron, Ohio.



ABOVE:—*Port shaft, struts and propeller of seagoing hopper-dredge. Goodrich Cutless Bearings are used in both struts. This dredge also equipped with Goodrich Cutless Pintle Bearings.*

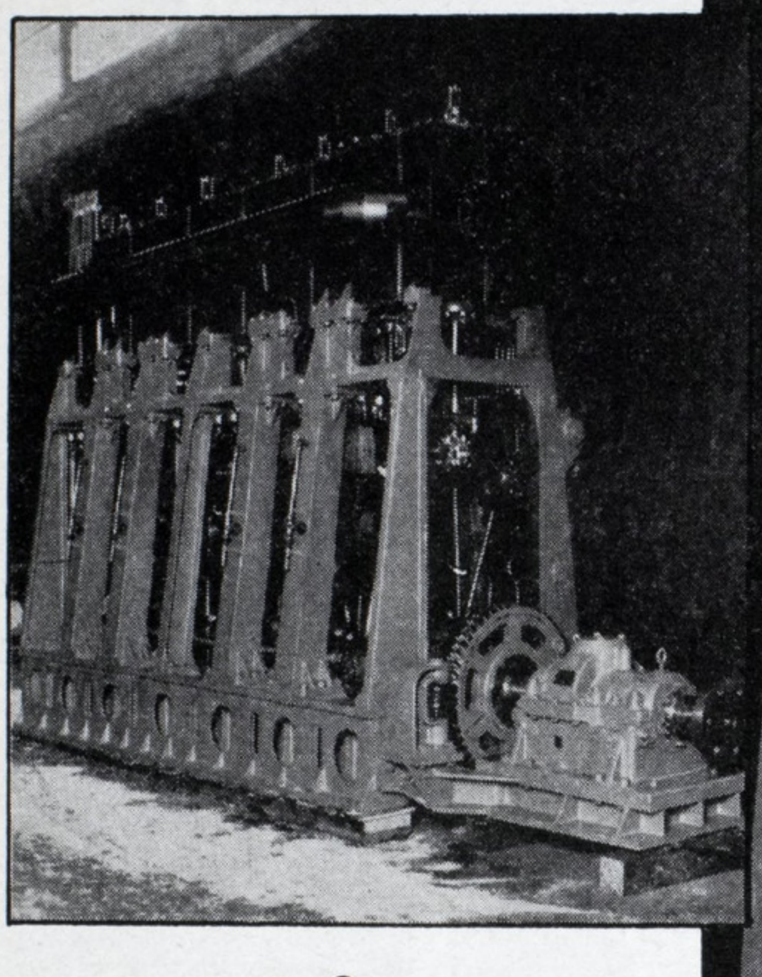
BELOW: — *Hard, sharp particles of sand or grit are pressed down into rubber of the bearing, rolled (not dragged) into one of these grooves and washed right out. Neither bearing nor shaft is harmed.*

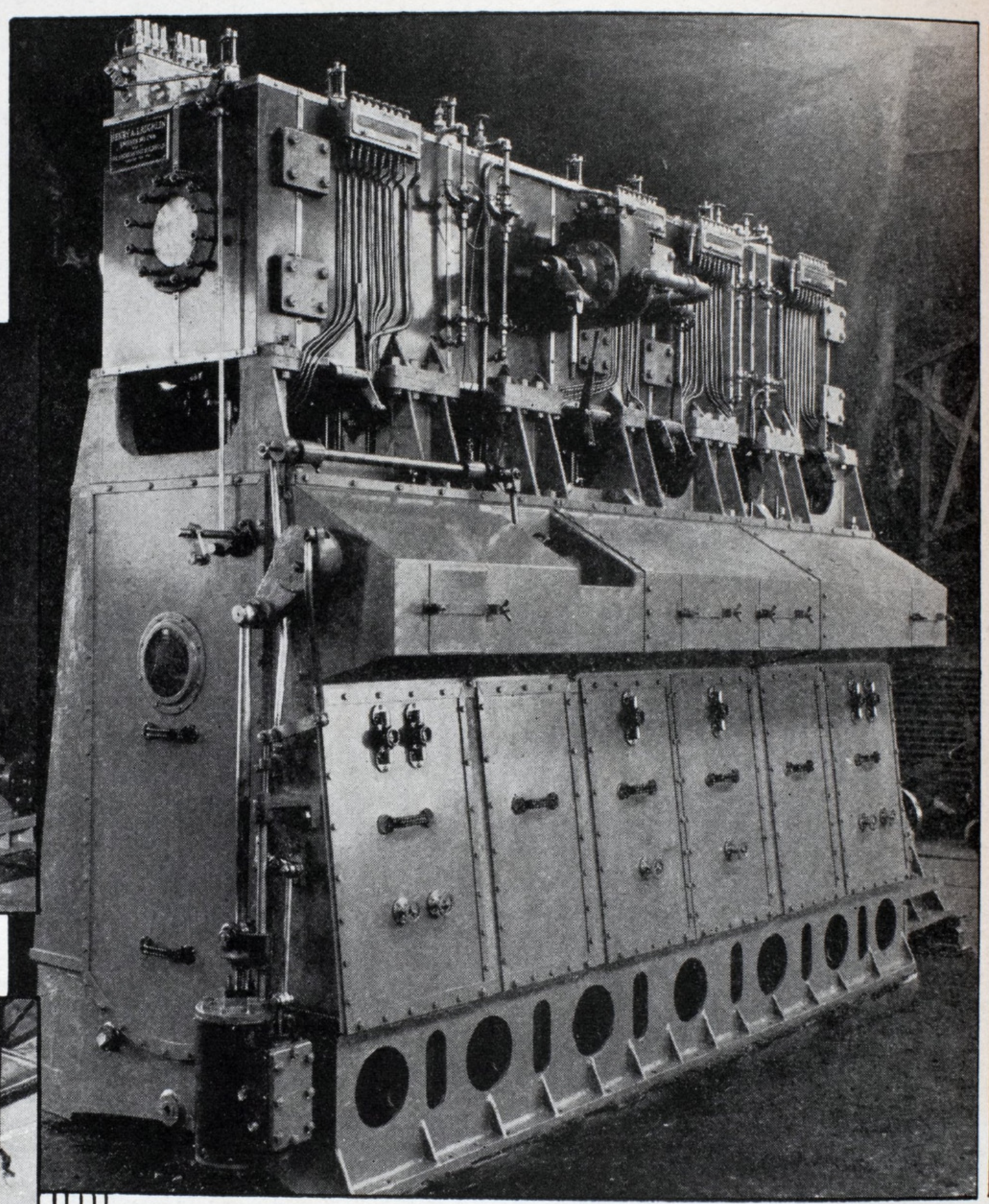


Cutless **Bearings**

Another B. F. Goodrich Product

ENGINES for shallow-draft RIVER VESSELS





FOUR crank, triple expansion engine. Develops 750 I. H. P. Totally enclosed for forced lubrication. Self-oiling.

The big thing about this engine is that it is *completely balanced*—which reduces vibration to the minimum. That is what makes this type of engine especially suitable for shallow-draft river vessels, on which absence of vibration is essential.

Of course this engine was built by The American Ship Building Company. Inquiries will receive prompt attention.

The AMERICAN SHIP BUILDING COMPANY

CLEVELAND	LORAIN	BUFFALO	SOUTH CHICAGO	SUPERIOR
American Ship Building Co.	*American Ship Building Co.*	*Buffalo Dry Dock Company*	*Chicago Ship Building Co.*	*Superior Shipbuilding Co.*

In Ship Construction

TRI-LOK

"KING OF THE WALK" TRADE MARK

Is *Unequalled*

The *fact* that all recent U. S. Naval Cruisers have been equipped with Tri-Lok Duraluminum Gratings and Tri-Lok Safety Hatchway Steps, is *significant evidence* of its acceptance among leading naval designers.

The Tri-Lok design has the great advantage of simplicity . . . uses no rivets, bolts, or welds . . . gives maximum strength with minimum dead weight . . . permits the use of any metal or alloy, in shapes to suit any engine room . . . affords the maximum opening for light, air and cleanliness.

TRI-LOK

RECTANGULAR . . .
DIAGONAL . . . RADIAL

GRATINGS *and* SAFETY STEPS

Manufactured by

THE TRI-LOK COMPANY
PITTSBURGH, PA.

National Distributors

DRAVO-DOYLE COMPANY
PITTSBURGH, PA.

Great Lakes Hull under construction at our River Rouge Yard. From an etching by Vernon Howe Bailey.

HIGHEST STANDARDS

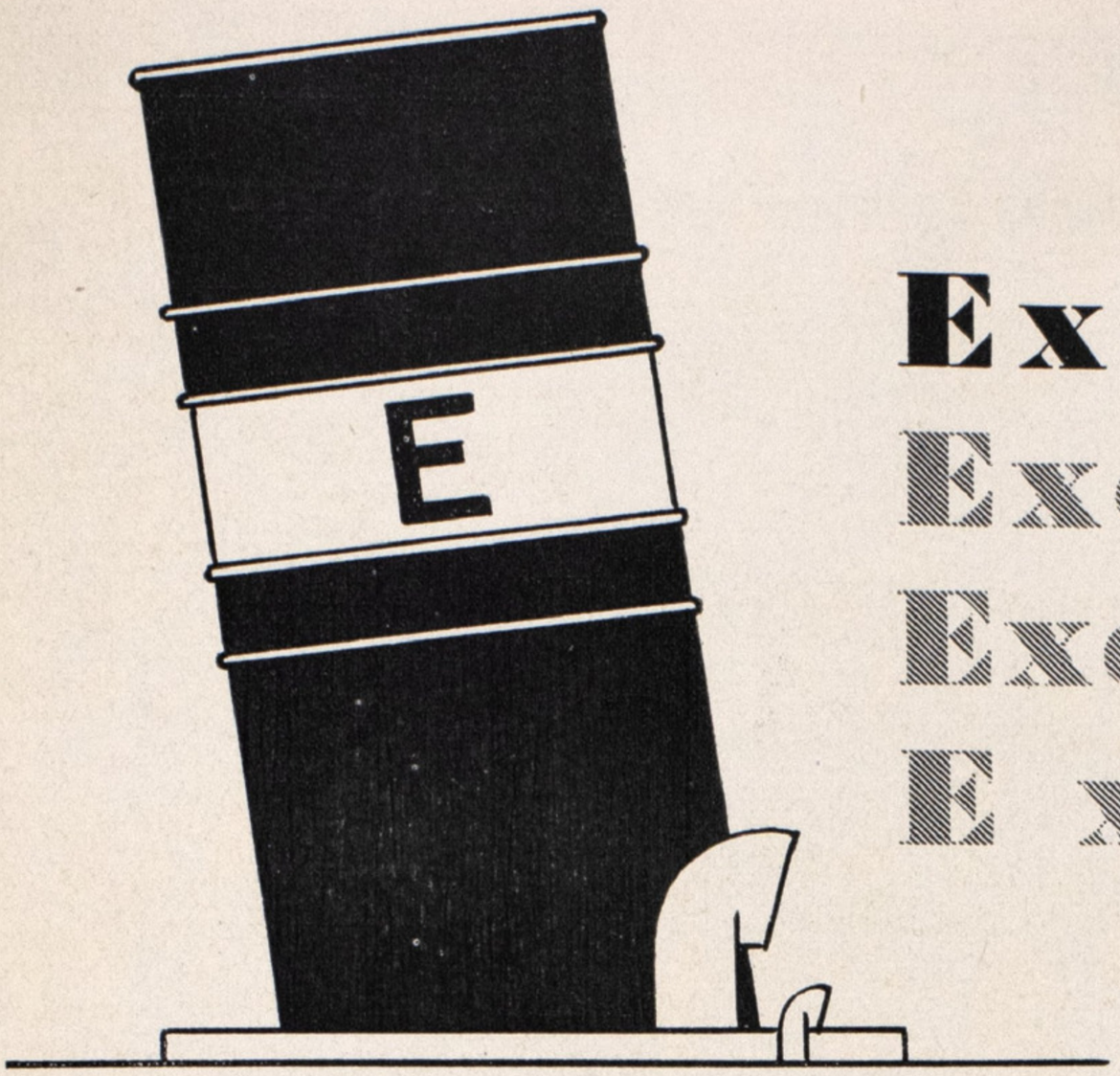
of workmanship, engineering and service are ever apparent in Great Lakes built ships and engines—and repairs.

GREAT LAKES ENGINEERING WORKS

Engine Works Equipped For General Heavy Machine and Foundry Work
Detroit, Mich.

Shipbuilders and Engineers
General Offices
River Rouge, Michigan
Cleveland Office: Union Trust Bldg.

Complete Shipbuilding Dry Dock and Repair Facilities
River Rouge, Mich., and Ashtabula, Ohio



Excalibur
Exochorda
Excambion
Exeter

Export Steamship Company—Owners
George G. Sharp—Architect
New York Shipbuilding Co.—Builders

WE are proud of the selection of 26 Warren Pumps for this fine new liner and for each of her three sister ships.

Warren

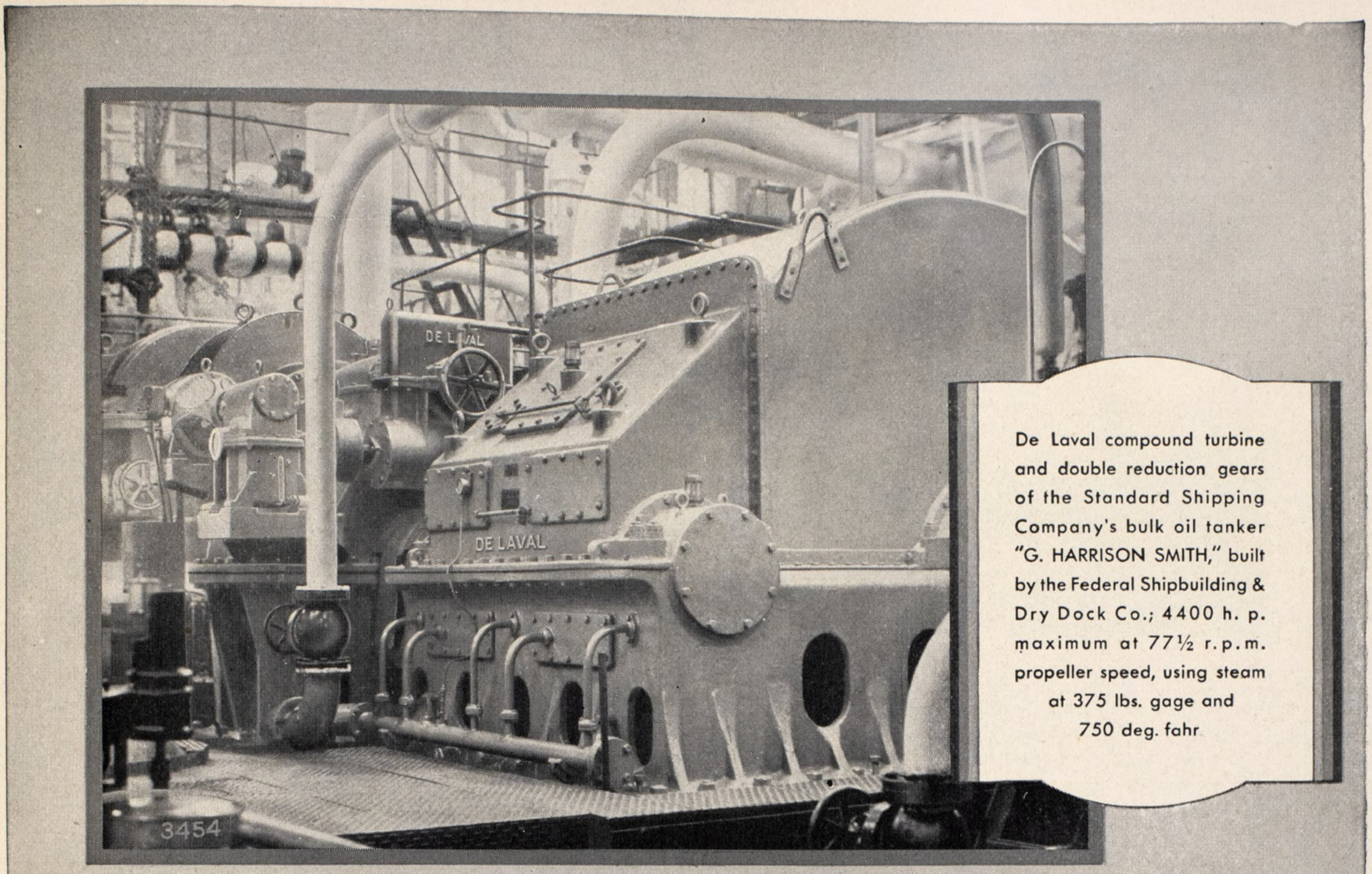
Steam Pump Company Inc.

Warren Engineering Corp., 117 Liberty Street, New York City
M. L. Katzenstein, President

Warren Massachusetts

Western Engineering Company, 58 Main Street
San Francisco, California

4783

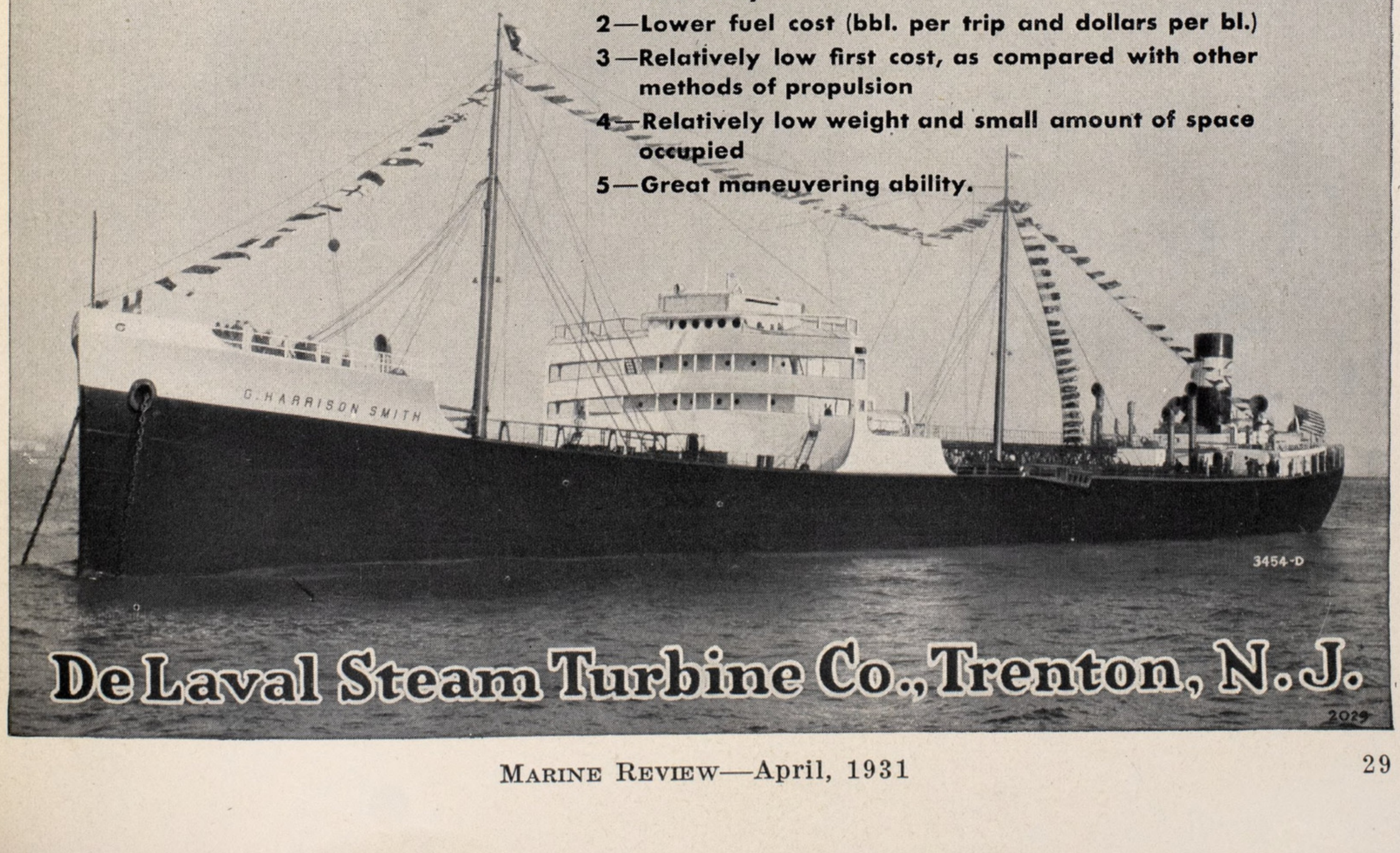


De Laval compound turbine and double reduction gears of the Standard Shipping Company's bulk oil tanker "G. HARRISON SMITH," built by the Federal Shipbuilding & Dry Dock Co.; 4400 h. p. maximum at 77½ r.p.m. propeller speed, using steam at 375 lbs. gage and 750 deg. fahr.

LOW COST, RELIABLE POWER *from* DE LAVAL GEARED TURBINES

De Laval compound turbines and double reduction gears have been selected for the propulsion of modern bulk oil carriers because of their

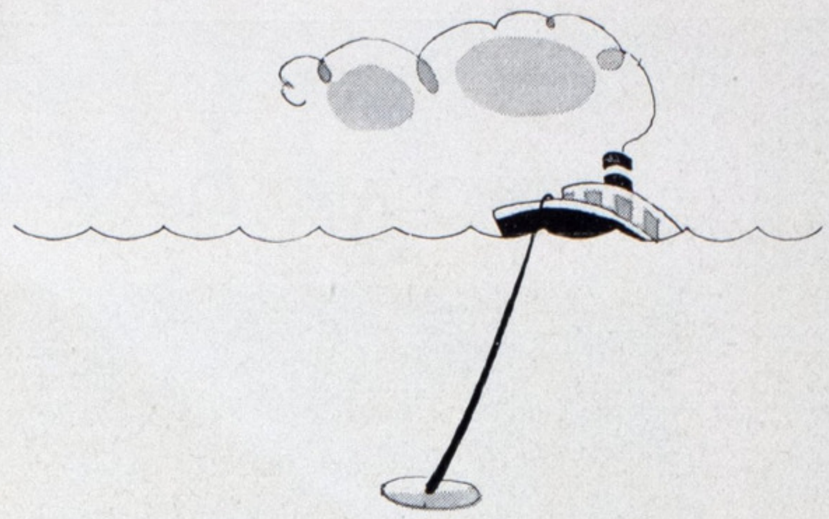
1—Reliability
2—Lower fuel cost (bbl. per trip and dollars per bl.)
3—Relatively low first cost, as compared with other methods of propulsion
4—Relatively low weight and small amount of space occupied
5—Great maneuvering ability.

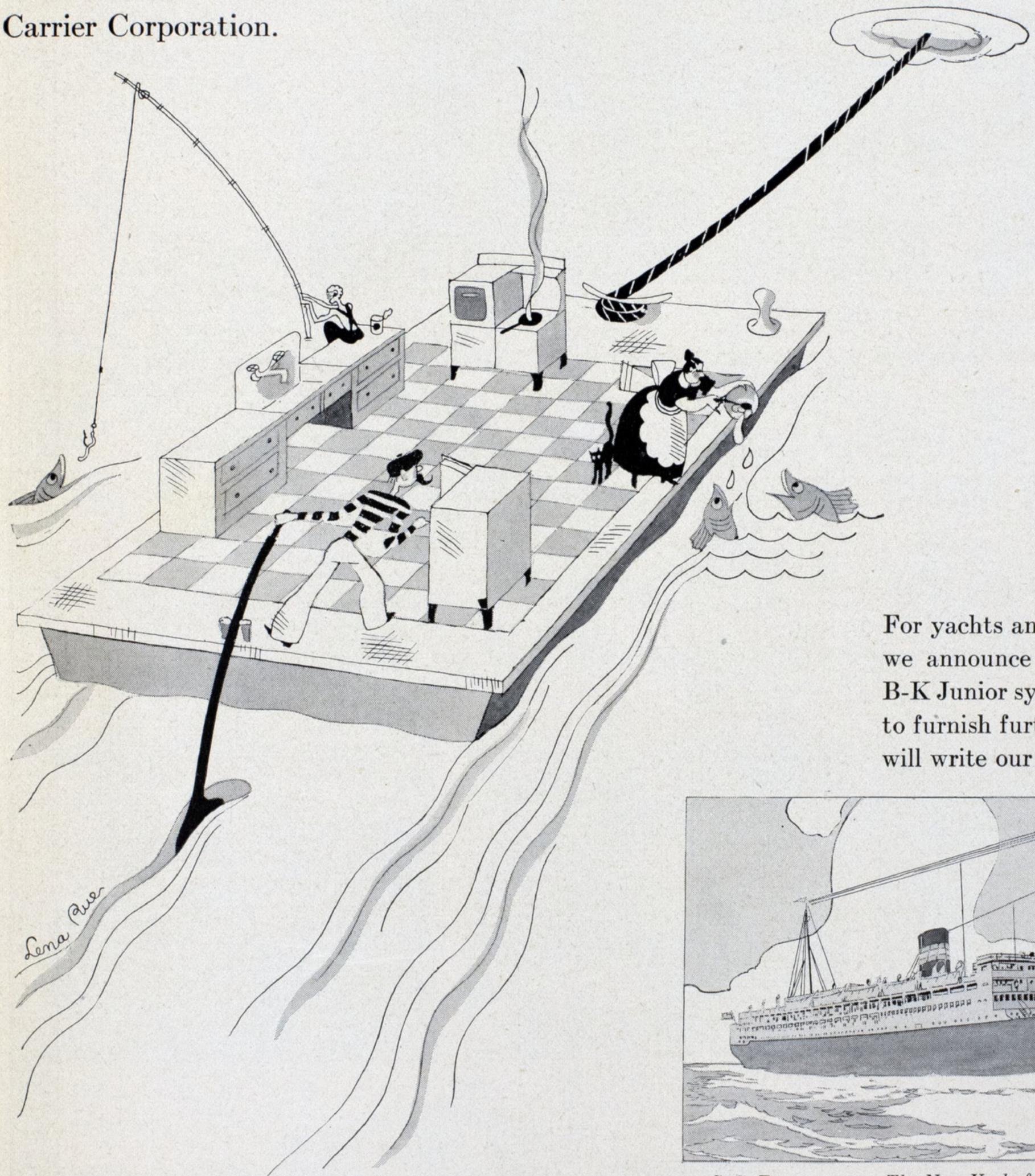


De Laval Steam Turbine Co., Trenton, N. J.

2029

KITCHENS never went to sea! It's galley or starve! Landlubber equipment on board ship is just as inappropriate as landlubber language. Brunswick-Kroeschell refrigeration is marine through and through. For more than thirty years our systems have cooled cargoes, preserved stores and made ice on every type of vessel—more than 3000 of them. Whether you're planning a cabin cruiser or an ocean liner, we're prepared to join your crew. Brunswick-Kroeschell Company, New Brunswick, New Jersey. A Division of Carrier Corporation.





For yachts and craft under 100 foot, we announce for the first time our B-K Junior systems. We shall be glad to furnish further information if you will write our New Brunswick offices.

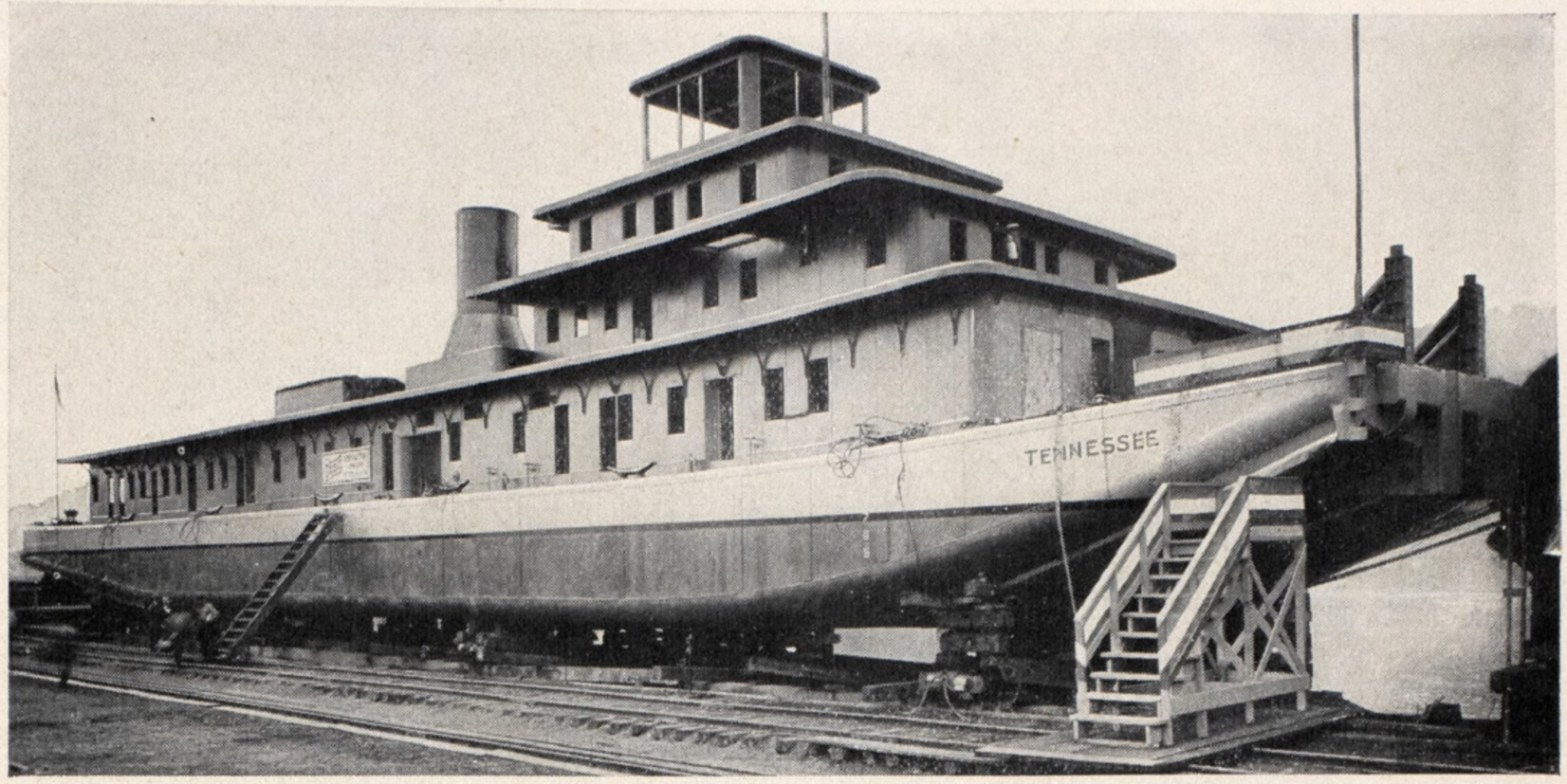
S. S. BORINQUEN, *The New York & Porto Rico Steamship Co., Brunswick-Kroeschell equipped. One of more than 3000.*

Carrier Brunswick-Kroeschell

REFRIGERATION

1100 Steel Hulls

built in the last 15 years



TENNESSEE — a sister ship of the OHIO — on launching ways at our Pittsburgh Shipyard.

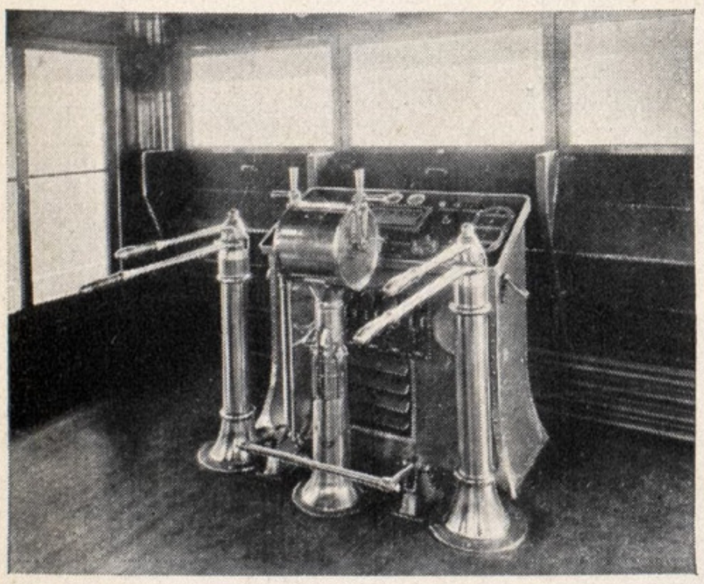
Designed by Cox & Stevens, Naval Architects

Standard Unit Navigation Co., Engineers

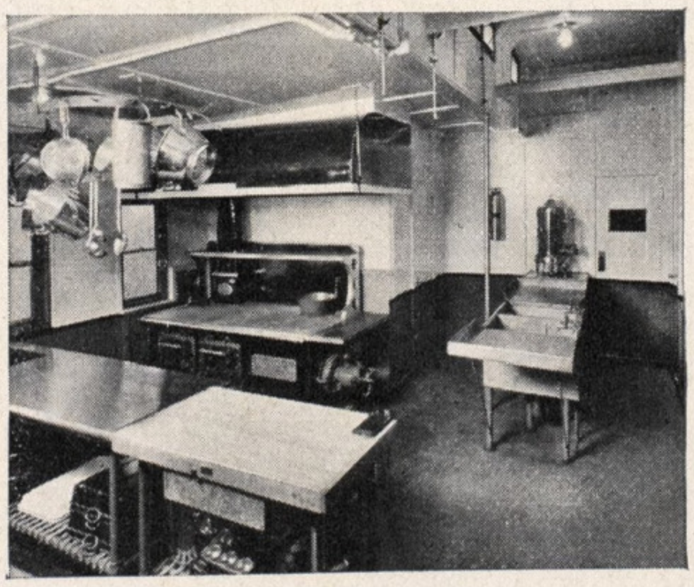
DRAVO has for fifteen years specialized in the construction of every type of floating craft for inland river, harbor and coastwise service, including barges, dredges, derrick boats, whirler boats, lighters, mixer boats, compressor boats, oil barges, dump scows, carfloats, and all types of

Steam and Diesel TOWBOATS

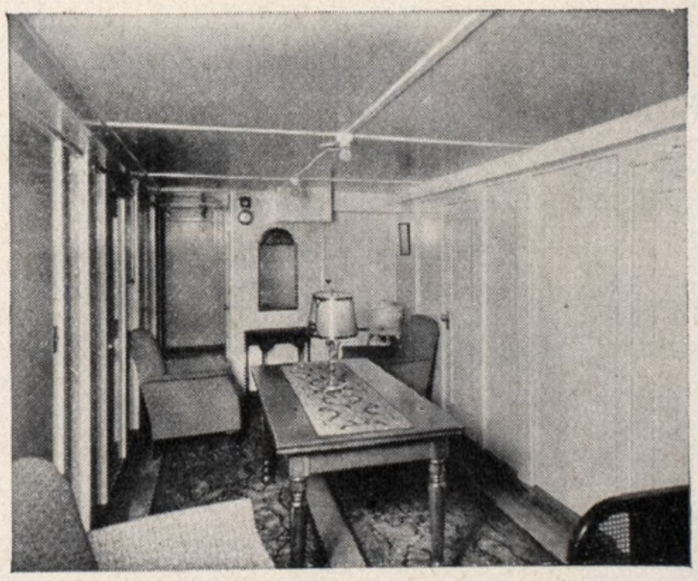
Also specialists in dock and material handling installations.



Control Room



Galley



Lounge

The Dravo Contracting Company

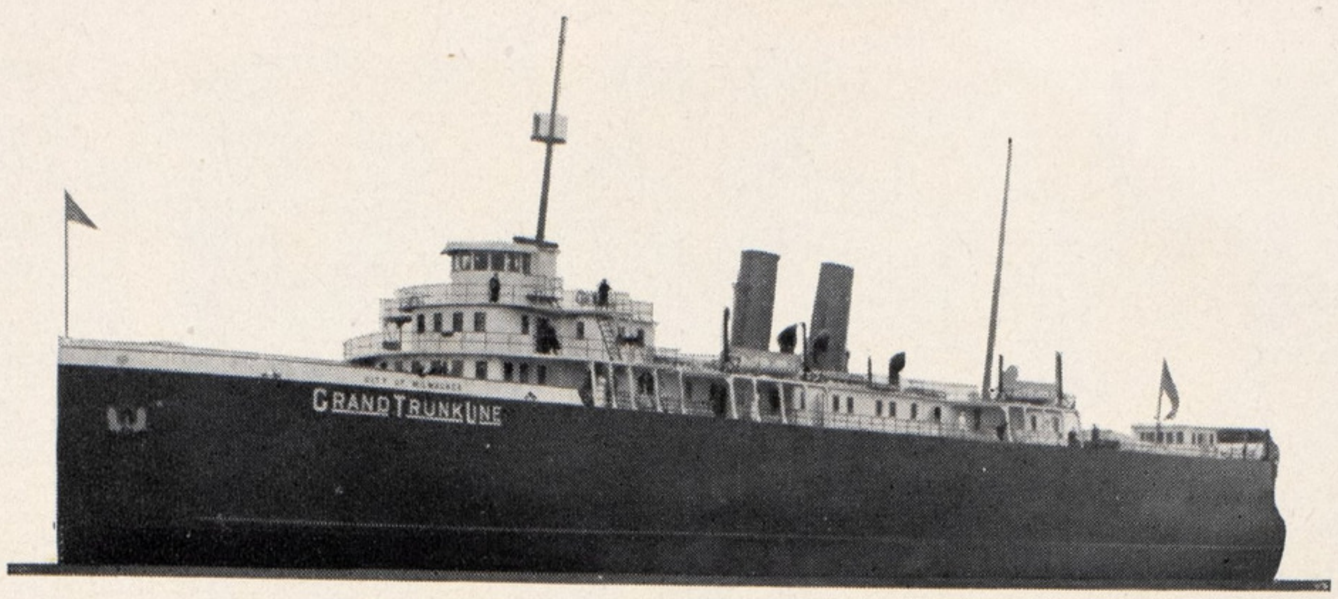
A Subsidiary of Dravo Corporation

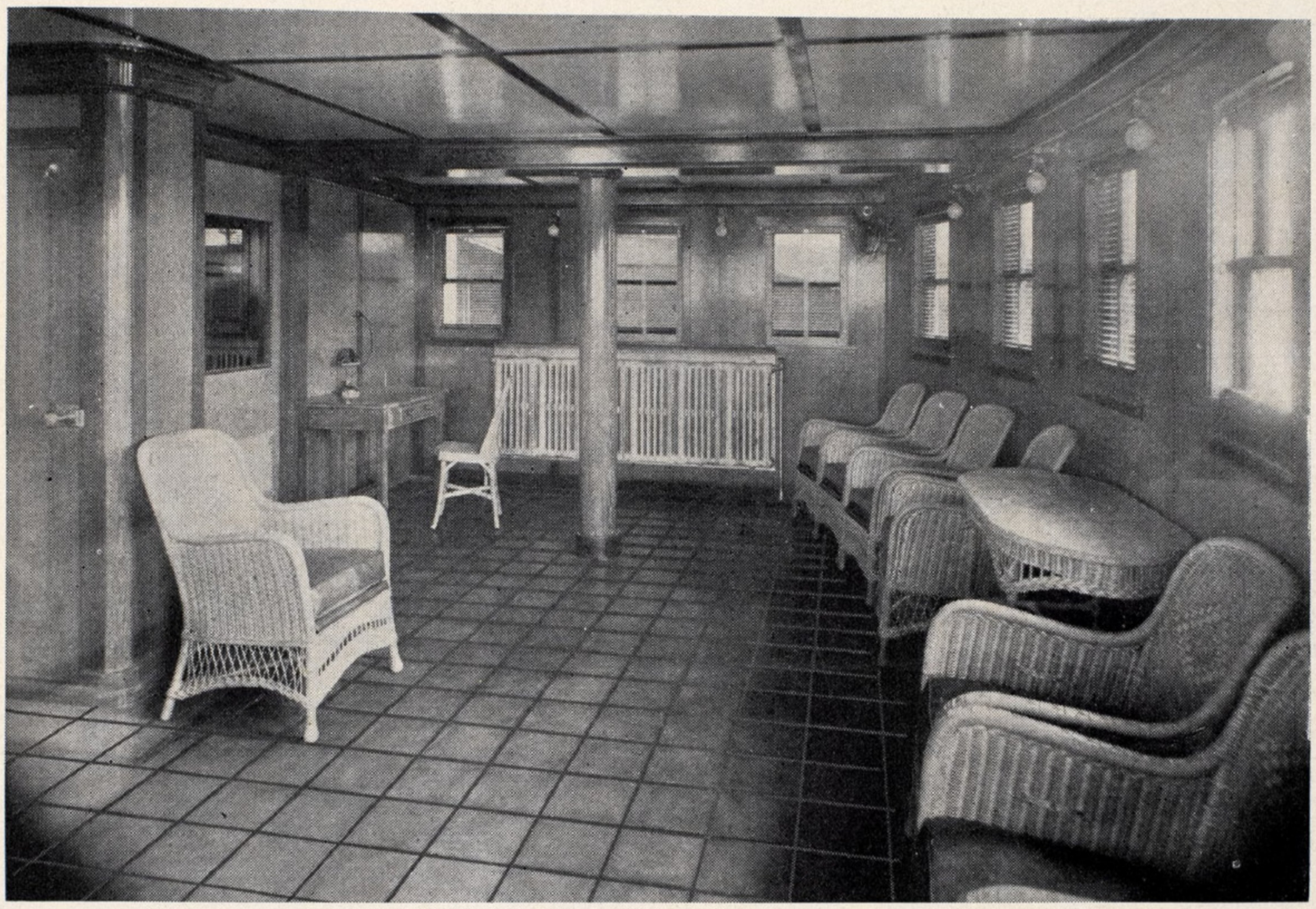
DESIGNERS - - - ENGINEERS - - - BUILDERS

Shipyards:
Neville Island, Ohio River, Pittsburgh, Pa.
Christiana River, Wilmington, Delaware.

General Offices and Shops:
Neville Island,
Pittsburgh, Pa.

TROUBLE-PROOF FLOORS





Observation Room S. S. City of Milwaukee. Grand Trunk Milwaukee Carferry Co.— Owners Manitowoc Shipbuilding Corpn., Builders.

"Homogeneous" is a big *word* and when applied to floors it has a big meaning. On the S.S. "CITY OF MILWAUKEE" recently completed at Manitowoc "homogeneous floors" means SELBALITH. Not a sheathing of this over a layer of that but a deck sheathing smoothing out the inequalities of lapped deck plates and a deck covering finished and ready for use all in the same thickness of the same material. In the main saloon, smoking room and observation room SELBALITH is a colored tile of one color with inlaid joints of another color,—elsewhere on the ship a smooth seamless colorful flooring. Both SELBALITH TILE and plain colored SELBALITH are fireproof, watertight, vermin-proof and corrosion-proof. A roll call of SELBALITH installations includes the names of the latest carferries on the lakes built for the Pere-Marquette Railway as well as for the Grand Trunk Milwaukee Carferry Company.

Approved by the American Bureau of Shipping

SELBY, BATTERSBY & CO., INC.

Philadelphia
33rd & Arch Sts.

FLOOR CRAFTERS

New York City
135 Liberty St.

The *1930* Roll Call . . .

VESSEL	BUILDER	OWNER
J. R. Sensibar	American Shipbuilding Co.	Construction Materials Co.
Corsair	Bath Iron Works Corporation	J. Pierpont Morgan
Caroline	Bath Iron Works Corporation	E. R. Johnson
Harry F. Sinclair	Bethlehem Shipbuilding Corp.	Sinclair Navigation Co.
Virginia Sinclair	Bethlehem Shipbuilding Corp.	Sinclair Navigation Co.
Mariposa	Bethlehem Shipbuilding Corp.	Matson Navigation Co.
Monterey	Bethlehem Shipbuilding Corp.	Matson Navigation Co.
Lurline	Bethlehem Shipbuilding Corp.	Matson Navigation Co.
Portland	Bethlehem Shipbuilding Corp.	U. S. Navy
Borinquen	Bethlehem Shipbuilding Corp.	N. Y. & P. R. Steamship Co.
Cruiser 32	Brooklyn Navy Yard	U. S. Navy
Walter Meseck	A. C. Brown & Son	Meseck Towing Co.
Liston	Charleston Dry Dock & Machine Co.	U. S. Engineers, Philadelphia
Avalanche	Consolidated Shipbuilding Corp.	Anson H. Ward
Velero III	Craig Shipbuilding Co.	G. Allen Hancock
Prescotont	Davie Shipbuilding & Repairing Co.	Canadian Pacific Railway
Ohio	Dravo Contracting Co.	Standard Unit Navigation Co.
Tennessee	Dravo Contracting Co.	Standard Unit Navigation Co.
James W. Good	Dubuque Boat & Boiler Works	Inland Waterways Corp.
Patrick J. Hurley	Dubuque Boat & Boiler Works	Inland Waterways Corp.
Herbert Hoover	Dubuque Boat & Boiler Works	Inland Waterways Corp.
G. Harrison Smith	Federal Shipbuilding & Dry Dock Co.	Standard Shipping Co.
W. S. Farrish	Federal Shipbuilding & Dry Dock Co.	Standard Shipping Co.
City of Baltimore	Federal Shipbuilding & Dry Dock Co.	Baltimore Mail Steamship Line
City of Norfolk	Federal Shipbuilding & Dry Dock Co.	Baltimore Mail Steamship Line
City of Newport News	Federal Shipbuilding & Dry Dock Co.	Baltimore Mail Steamship Line
City of La Havre	Federal Shipbuilding & Dry Dock Co.	Baltimore Mail Steamship Line
City of Hamburg	Federal Shipbuilding & Dry Dock Co.	Baltimore Mail Steamship Line
Myron C. Taylor	Great Lakes Engineering Works	Pittsburgh Steamship Co.
1057	Geo. Lawley & Son Corp.	City of Boston
1058	Geo. Lawley & Son Corp.	City of Boston
City of Flint	Manitowoc Shipbuilding Corp.	Pere Marquette Railway
Cruiser 38	Mare Island Navy Yard	U. S. Navy
Margaret J.	Nashville Bridge Co.	Jackson & Sons
Morro Castle	Newport News Shipbuilding & Dry Dock Co.	Ward Line
Oriente	Newport News Shipbuilding & Dry Dock Co.	Ward Line
President Hoover	Newport News Shipbuilding & Dry Dock Co.	Dollar Steamship Lines
President Coolidge	Newport News Shipbuilding & Dry Dock Co.	Dollar Steamship Lines
Santa Clara	New York Shipbuilding Co.	Grace Line
Excaliber	New York Shipbuilding Co.	Export Steamship Corp.
Exocharda	New York Shipbuilding Co.	Export Steamship Corp.
Exeter	New York Shipbuilding Co.	Export Steamship Corp.
Excambion	New York Shipbuilding Co.	Export Steamship Corp.
Hull 405	New York Shipbuilding Co.	U. S. Lines
Hull 406	New York Shipbuilding Co.	U. S. Lines
Indianapolis	New York Shipbuilding Co.	U. S. Navy
Cruiser 36	Philadelphia Navy Yard	U. S. Navy
Cruiser 34	Puget Sound Navy Yard	U. S. Navy
Cambriona	Pusey & Jones Corp.	Walter Briggs
Hull 1049	Pusey & Jones Corp.	Curtis Bay Towing Co.
Rochester	Pusey & Jones Corp.	Erie Railroad
Scranton	Pusey & Jones Corp.	Erie Railroad
Olean	Pusey & Jones Corp.	Erie Railroad
Cleveland	Pusey & Jones Corp.	Erie Railroad
Hull 1051	Pusey & Jones Corp.	Chesapeake & Ohio Railway
Tompkins	Leathem D. Smith Dock Co.	U. S. Engineers
Hull 94	John W. Sullivan Co.	City of New York
Western Sun	Sun Shipbuilding & Dry Dock Co.	Motor Tankship Corp.
Eastern Sun	Sun Shipbuilding & Dry Dock Co.	Motor Tankship Corp.
Tidewater	Sun Shipbuilding & Dry Dock Co.	Tide Water Oil Co.
Tidewater Associated	Sun Shipbuilding & Dry Dock Co.	Tide Water Oil Co.
Brilliant	Sun Shipbuilding & Dry Dock Co.	Standard Transportation Co.
Comet	Sun Shipbuilding & Dry Dock Co.	Motor Tankship Corp.
Daylight	Sun Shipbuilding & Dry Dock Co.	Motor Tankship Corp.
Northern Sun	Sun Shipbuilding & Dry Dock Co.	Motor Tankship Corp.
Hull 132	Sun Shipbuilding & Dry Dock Co.	Motor Tankship Corp.
Hull 133	Sun Shipbuilding & Dry Dock Co.	Motor Tankship Corp.
Hull 184	Toledo Shipbuilding Co.	Pittsburgh Steamship Co.
DeVoe & Harold	United Dry Docks	B. & O. Railroad
Wm. J. Dickey	United Dry Docks	B. & O. Railroad
Tompkinsville	United Dry Docks	City of New York
Hull 798	United Dry Docks	City of New York
Indiana	Charles Ward Engineering Works	Standard Unit Navigation Co.
Louisiana	Charles Ward Engineering Works	Standard Unit Navigation Co.
Hull 88	Charles Ward Engineering Works	Vesta Coal Company
Hull 89	Charles Ward Engineering Works	Vesta Coal Company

of Worthington Equipped Vessels

A CHECK-UP of shipbuilding activities during 1930 shows that Worthington equipment was contracted for or installed in this list of American vessels.

The fact that most of the important ships of the year are represented speaks for itself. It means that the men responsible for performance and profitable operation in the Navy and Merchant Marine have again placed their indorsement on Worthington products.

Worthington appreciates this indorsement and accepts it as an added incentive to maintain the high standards established . . . and to push forward along the lines of conservative development that have characterized the company's record through three-quarters of a century of service to shipbuilding.

The experience of the Worthington Marine Division is offered without obligation. Backed by adequate manufacturing facilities, it is a factor to be considered whenever the building or reconditioning of ships is being planned.

PUMPS
All Sizes . . . All Types
For All Services
Any Capacity . . . Any Pressure
COMPRESSORS
Stationary and Portable
CONDENSERS
and Auxiliaries
DIESEL ENGINES
GAS ENGINES
FEEDWATER HEATERS
WATER, OIL and
GASOLINE METERS
MULTI-V-DRIVES
ROCK DRILLS
AUTOMATIC HEAT
TREATING MACHINES
FOR DRILL STEEL
FORGING FURNACES
FOR DRILL STEEL
DRILL STEEL
ACCESSORIES
CHROMIUM PLATING

Literature on request.

WORTHINGTON PUMP AND MACHINERY CORPORATION

Works: Harrison, N. J. Cincinnati, Ohio Buffalo, N.Y. Holyoke, Mass.

Executive Offices: 2 Park Avenue, New York, N.Y.

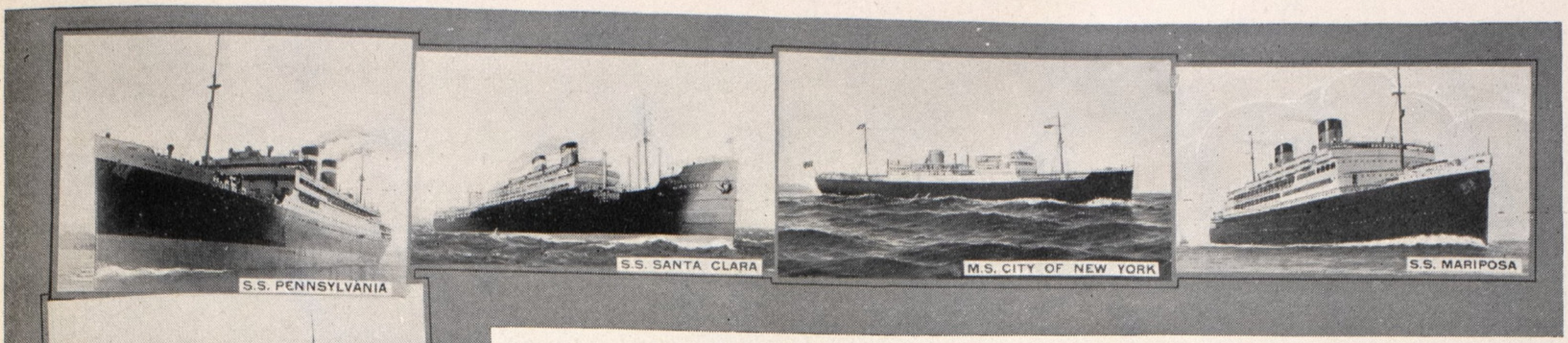
GENERAL OFFICES: HARRISON, N. J.

District Sales Offices and Representatives:

ATLANTA	CHICAGO	DALLAS	EL PASO	LOS ANGELES	PHILADELPHIA	ST. PAUL	SEATTLE
BOSTON	CINCINNATI	DENVER	HOUSTON	NEW ORLEANS	PITTSBURGH	SALT LAKE CITY	TULSA
BUFFALO	CLEVELAND	DETROIT	KANSAS CITY	NEW YORK	ST. LOUIS	SAN FRANCISCO	WASHINGTON

Branch Offices or Representatives in Principal Cities of all Foreign Countries

WORTHINGTON G-70



M&S Co.

NACO

added protection

is only one of the advantages considered by the builders of these well known ships when they specified

NACO ANCHOR CHAIN

for their equipment

The NACO link with integral stud which forever eliminates lost or loose stud troubles, the exact uniformity of links which enables the chain to run smoothly over the wildcat reducing friction and wear to the minimum, are just as important factors as is the 50% added strength which NACO chain possesses over ordinary anchor chain.

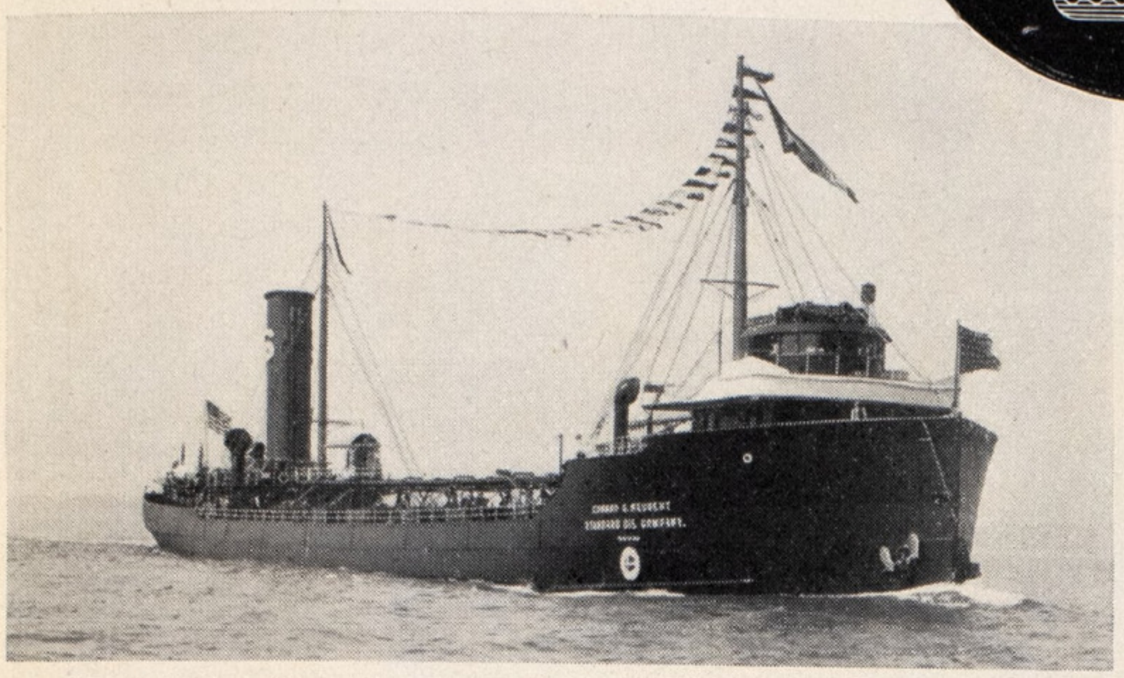
Manufactured and Sold only by

NATIONAL MALLEABLE AND STEEL CASTINGS CO.
General Office—Cleveland, O.

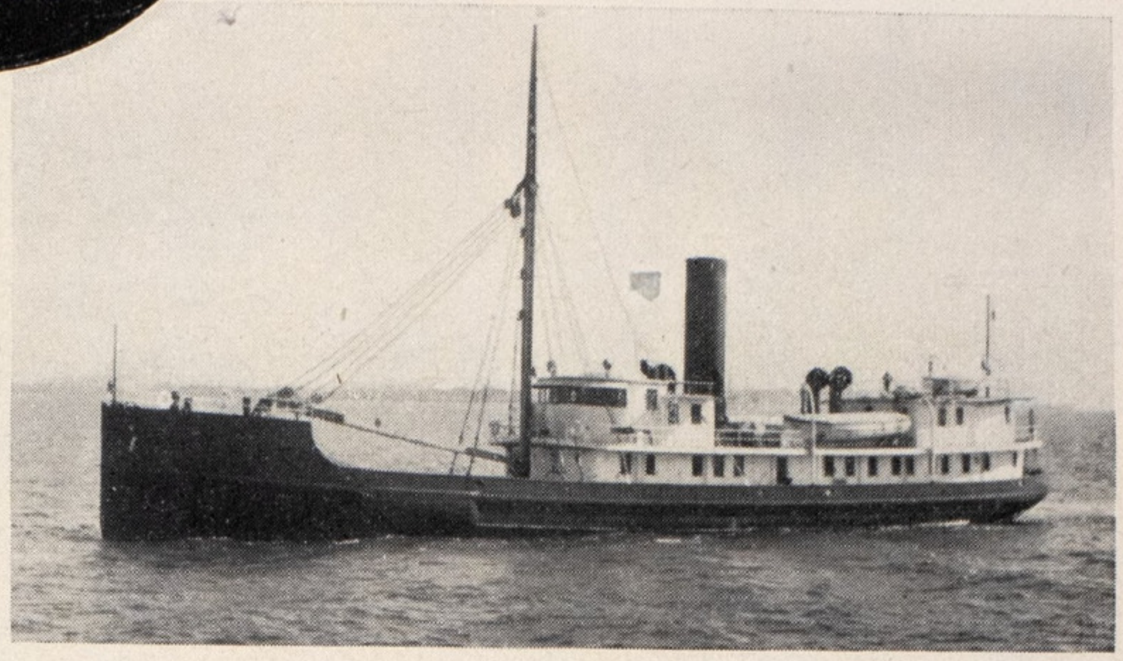
NACO TRADE MARK **CAST STEEL CHAIN**
The Strongest Chain Made

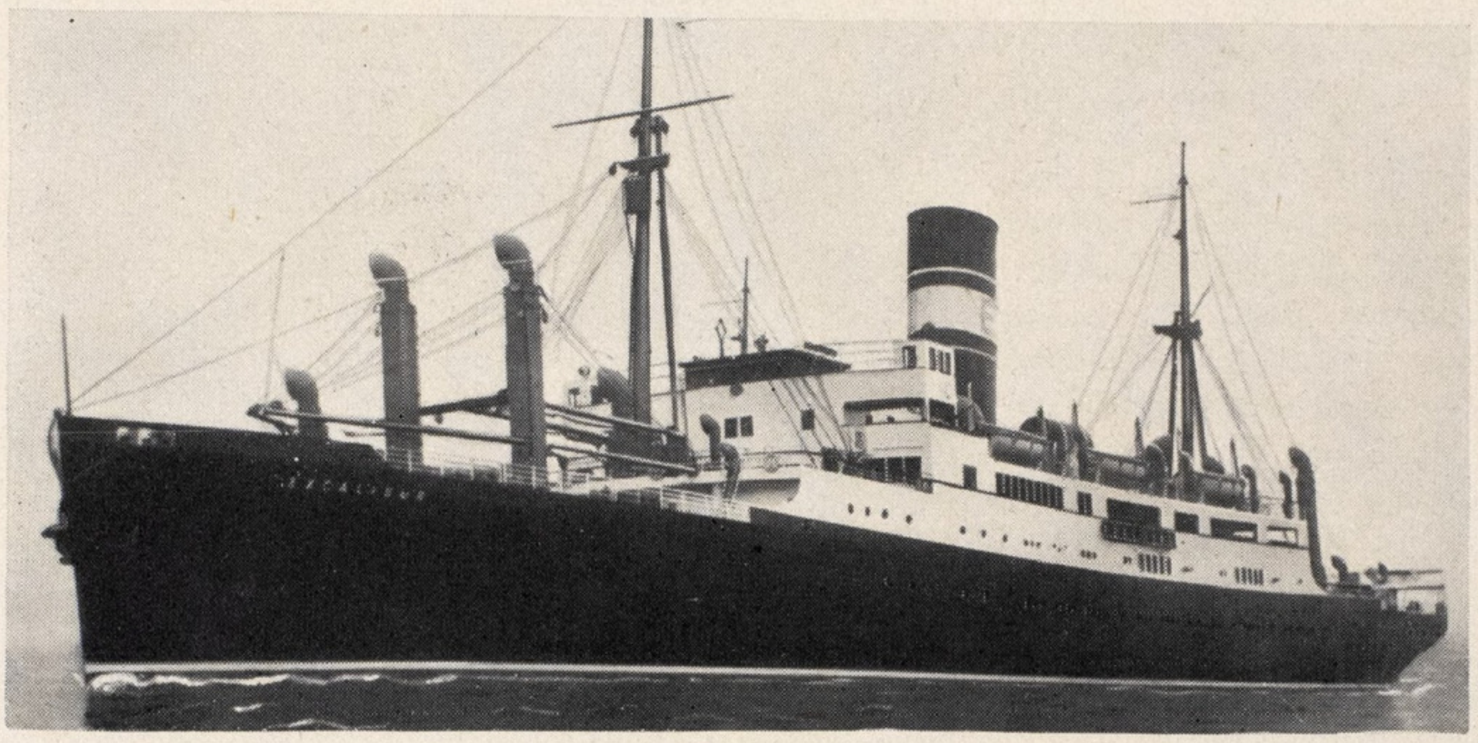
ADVANCED REFRIGERATION

"Edward G. Seubert," one of the latest and most modern tankers, owned by the Standard Oil Company of Indiana for Great Lakes service. Complete Frigidaire equipment refrigerates her storage boxes, cools drinking water and manufactures ice.



The Lighthouse Tender, "Violet," 770 tons displacement, serves the U. S. Bureau of Lighthouses on the waters of Chesapeake Bay. It is completely Frigidaire-equipped for refrigerating the main storage boxes and galley, as well as for ice making.





"Excalibur," one of the newest and most modern of the Export Steamship Corporation's fleet, is in the freight-passenger and mail service plying between New York and the Mediterranean ports. Both its officers' and crew's galley-service is Frigidaire-equipped.

AUTOMATIC REFRIGERATION FOR MARINE USE

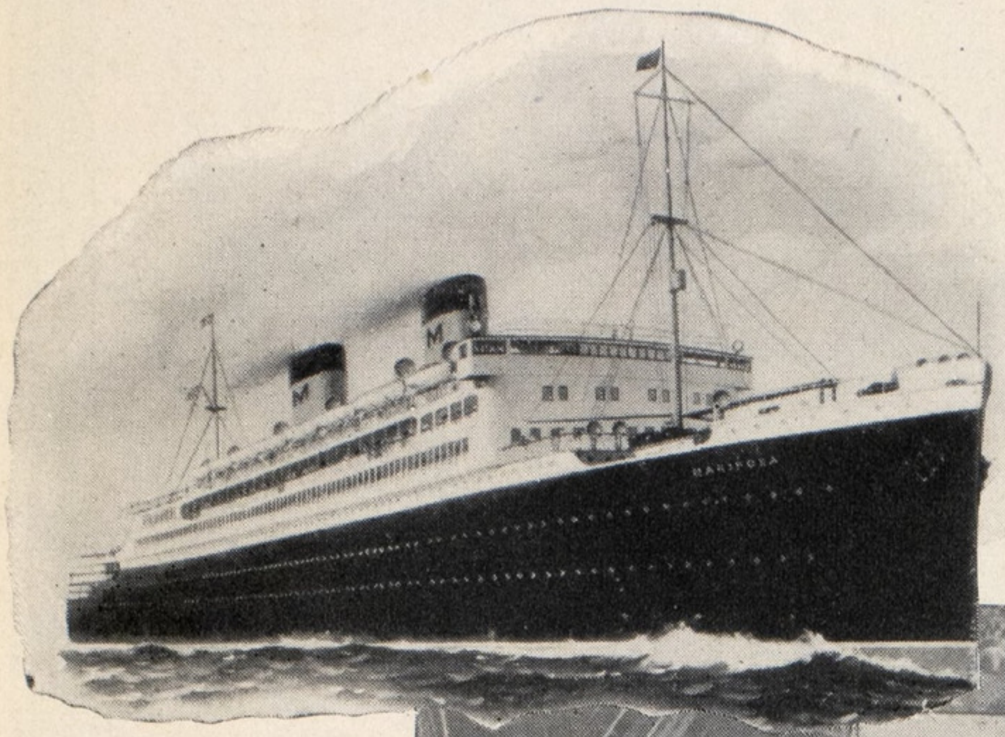
In every climate Frigidaire proves its ability to keep foods fresh and wholesome . . . indefinitely. It provides dependable refrigeration in the roughest weather. It is compact. The mechanism is accessible. It is engineered to provide surplus power for exceptional requirements. ● No matter what port you may enter, whether foreign or domestic, you'll find Frigidaire representatives. ● If inspection or adjustment is ever required, or new equipment needed, efficient service will be rendered promptly from a local Frigidaire office. ● You are invited to write for full information about Frigidaire equipment for marine installations. Address Frigidaire Corporation, Marine Division, Subsidiary of General Motors Corporation, Dayton, Ohio.

★ ★ **FRIGIDAIRE** ★ ★

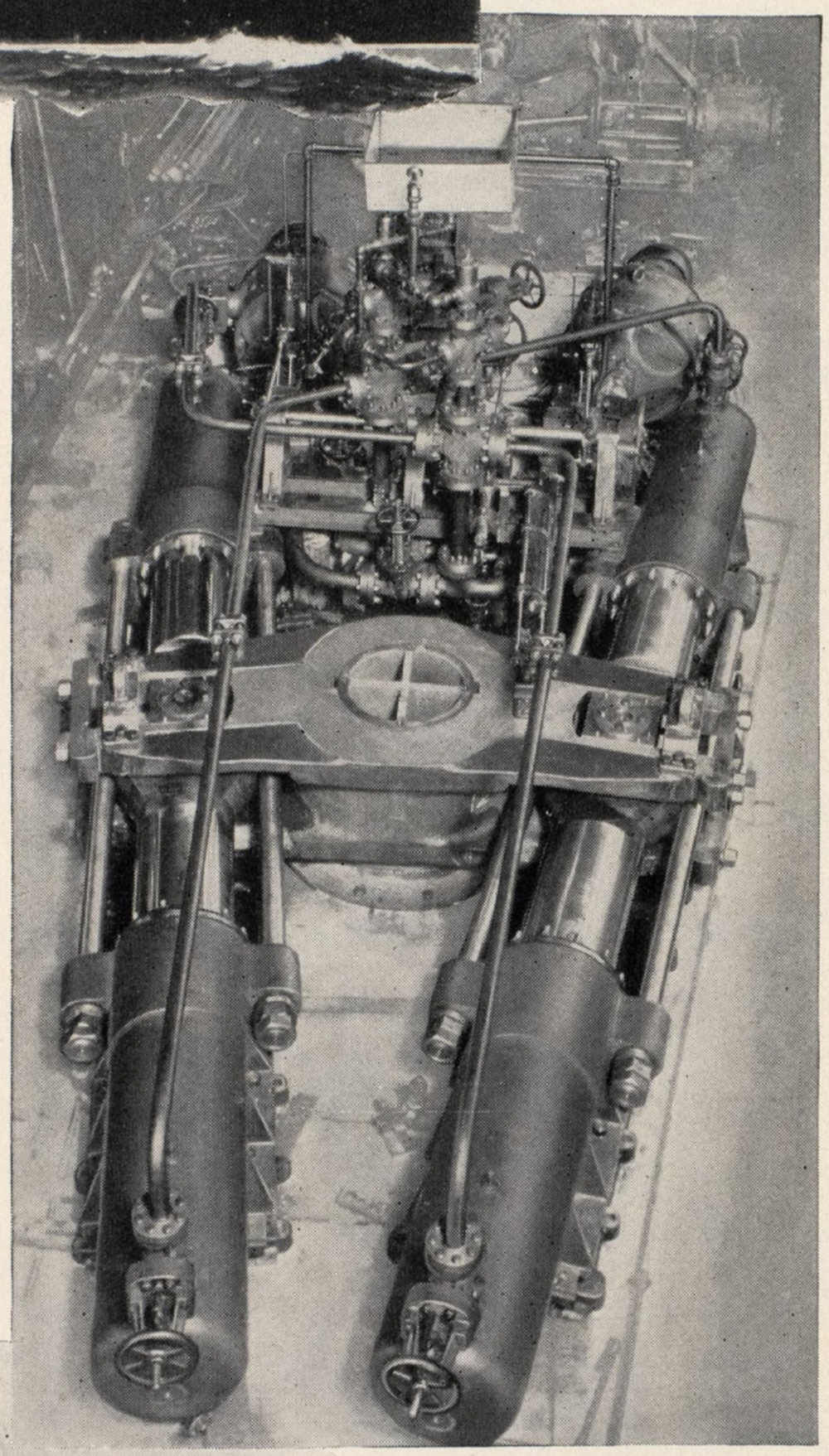
A GENERAL MOTORS VALUE

On the outstanding ships—

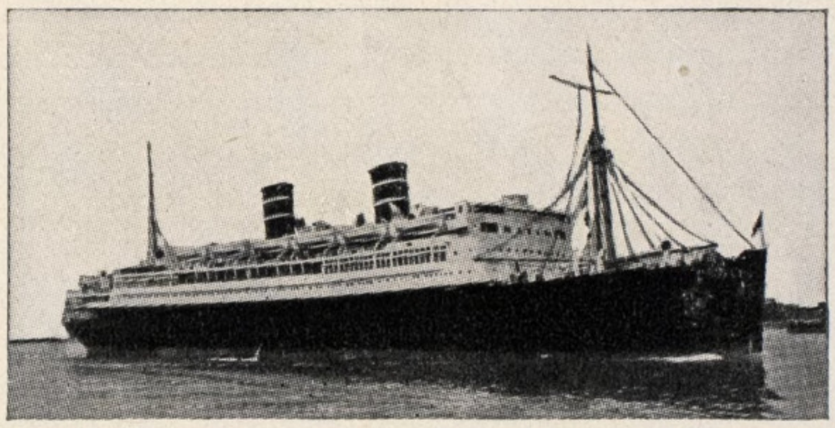
A-E-CO Auxiliaries



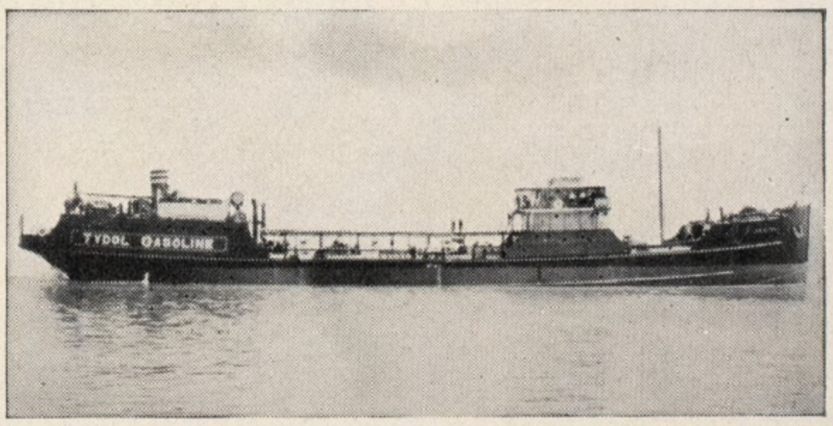
ABOVE: *The* Mariposa, *one of three new Matson Line boats which will be equipped with A-E-CO Electro-Hydraulic Steerers. One of these steerers is shown at the right.*



GLANCE at the central picture on this page... an electro-hydraulic steerer for one of the new Matson Line boats... it is a typical example of the kind of equipment the American Engineering Company is supplying for the outstanding new boats. On liners, tankers, tugs and river towboats A-E-CO Auxiliaries today are sustaining their reputation for dependable service... a reputation earned during the past seventy-five years on boats that sail the seven seas. You find them, too, on the smart yachts, on battleship, cruiser and Coast Guard craft... steerers, windlasses, winches, gypsies, hoists, capstans, telemotors, towing machines... the best that can be built.

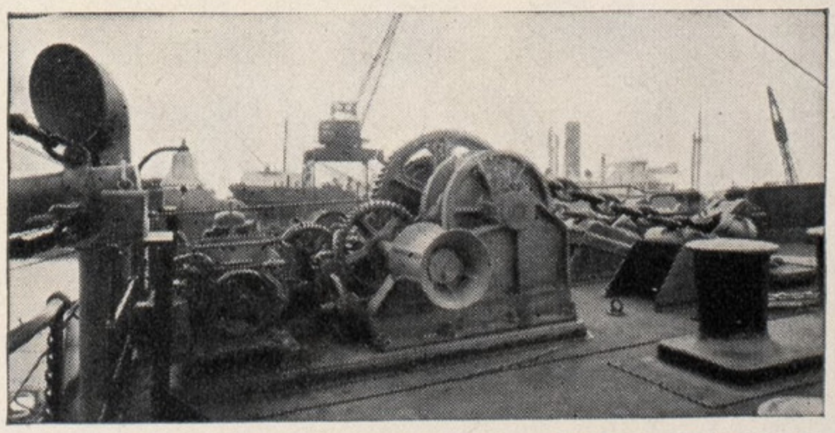


***On the* Morro Castle *and its sister ship, the* Oriente . . .**
A-E-CO Auxiliaries



Veedol, No. 2... *one of many tankers with A-E-CO Auxiliaries*

The* President Coolidge, *shown above, and its sister-ship the* President Hoover, *are to be equipped with A-E-CO Steerers, windlasses, capstans



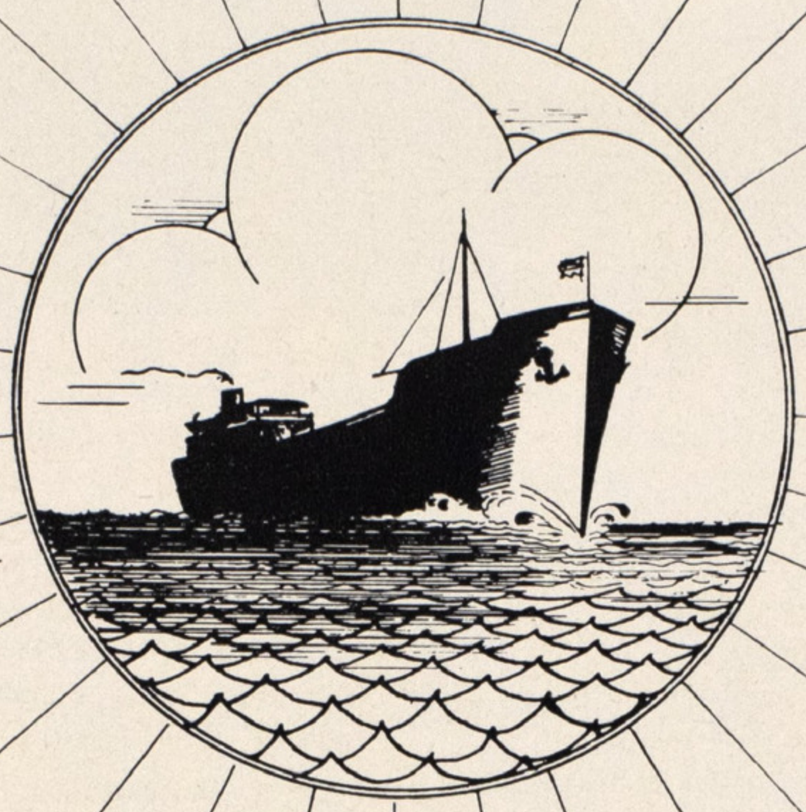
***A-E-CO Electric Windlass, as installed on the* City of New York**

AMERICAN ENGINEERING

AMERICAN ENGINEERING COMPANY, 2437 ARAMINGO AVENUE, PHILADELPHIA

ALL WELDED SHIPS

THE CONSTRUCTION OF THE FUTURE



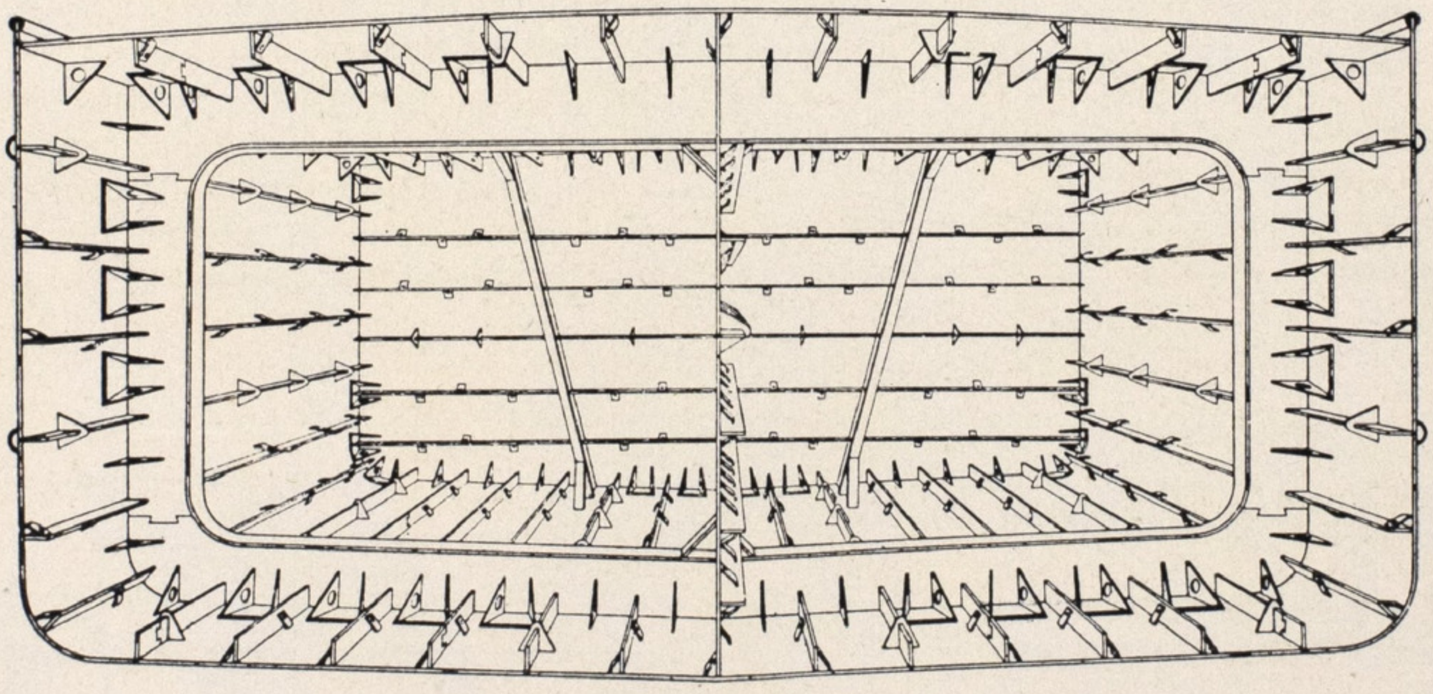
REDUCE CONSTRUCTION COSTS

INCREASE CARRYING CAPACITY

Richard F. Smith PATENT APPLIED FOR Lock Notch Welded System

APPROVED BY THE AMERICAN BUREAU OF SHIPPING

Used in All Types of Ship Construction Including Barges River Steamers and Dredges



MIDSHIP SECTION OF TRANSVERSE AND BULKHEAD

Does away entirely with Angles, Shapes, Rivets and Bolts

CHARLESTON DRY DOCK & MACHINE CO.

Sole Licensees for Smith System—Correspondence Invited with
Shipyards Desiring to Construct Vessels on this System—Reasonable Royalties

MARINE BOILERS — CHARLESTON, S. C. — TANKERS, FREIGHTERS, YACHTS BARGES, SCOWS, LIGHTERS

General Repairs to Wooden and Steel Vessels — Two Marine Railways

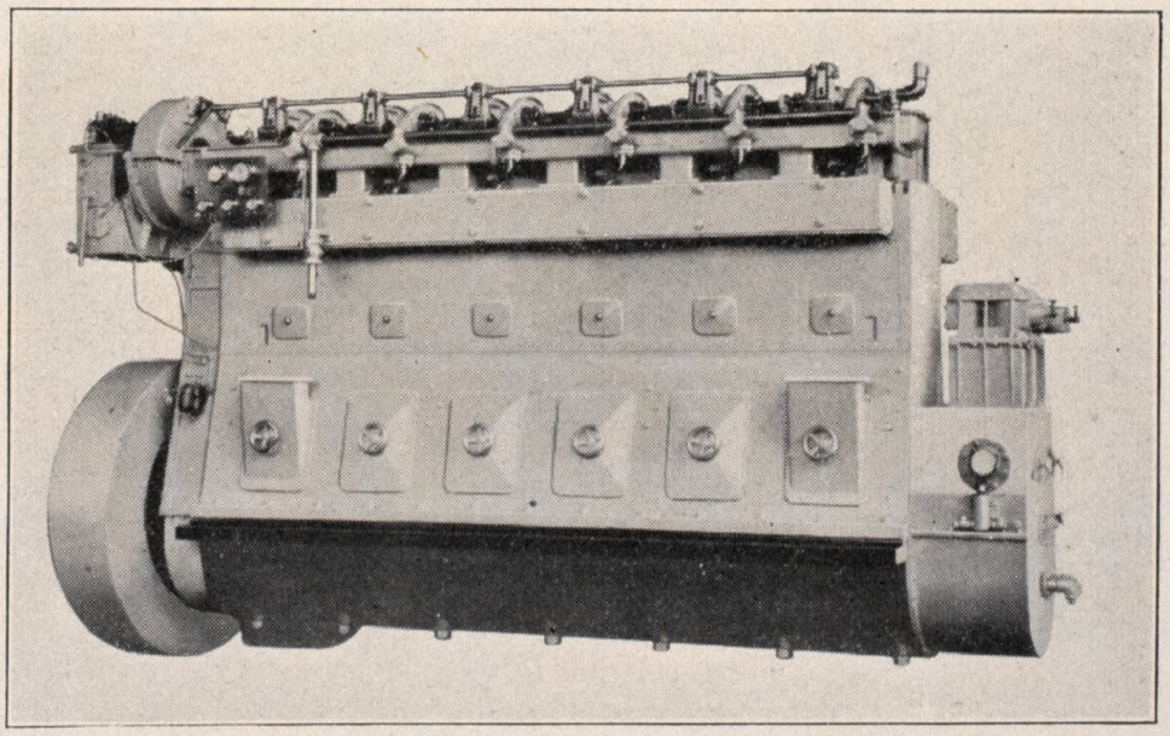
Prescotont—Length overall, 117 feet; breadth overall, 27 feet; draft, extreme, 12 feet. Speed, 11 knots. Power, two 500 h.p. Winton-Diesels.

WINTON-DIESEL ELECTRIC-DRIVE

A VESSEL of unusual interest and incidently the first of her type constructed in Canada is the Diesel-electric tug Prescotont, built at the Davie Shipbuilding & Repairing Company's yard at Lauzon, Quebec, to the order of the Canadian Pacific Car & Passenger Transfer Company, Limited, which operates a railway ferry service in the joint interests of the Canadian Pacific Railway and the New York Central Railroad.

The owner's requirements called for a power plant of the utmost dependability and a vessel of exceptional maneuvering ability. To meet these requirements, Winton-Diesel main engines and electric drive were installed. The two main engines are 500 h. p. units of advanced design. They have proved ideally suited to the service. Clean, simple, easy to operate, Winton-Diesels point the way to more efficient, profitable operation.

Built in sizes from 100 h.p. to 1500 h.p.

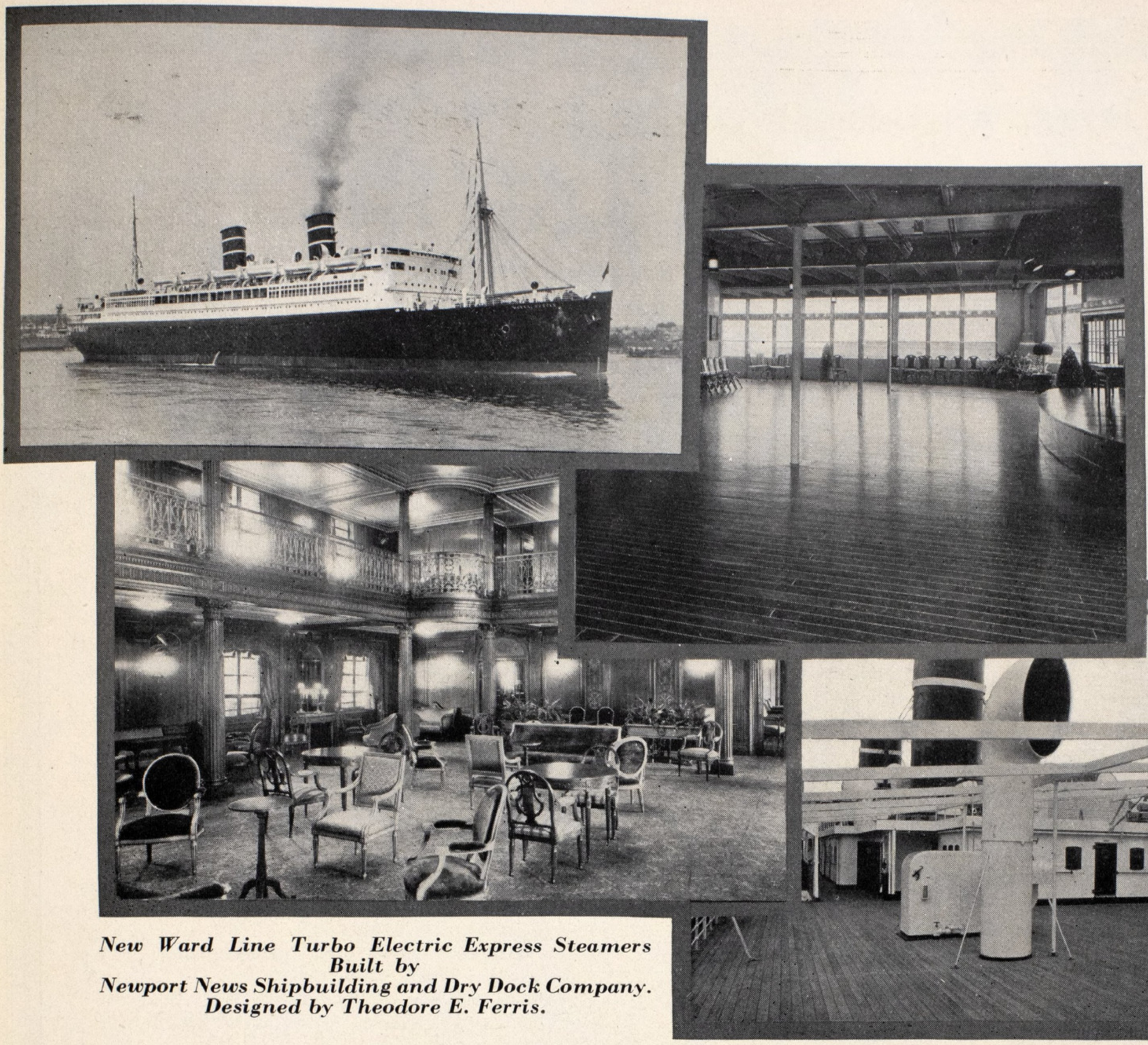


500 h.p. Winton-Diesel

WINTON ENGINE CORPORATION

CLEVELAND, OHIO, U. S. A.

WINTON



New Ward Line Turbo Electric Express Steamers
Built by
Newport News Shipbuilding and Dry Dock Company.
Designed by Theodore E. Ferris.

KEARFOTT WINDOWS

ON THE

S.S. MORRO CASTLE

&

S.S. ORIENTE

Shelter Windows enclose the promenade and dance deck. A new departure in an all-metal window with mechanical device for raising and lowering of 3/4" thick plate glass.

Kearfott-Kawneer Bronze Casements provide ample light and an attractiveness to social spaces.

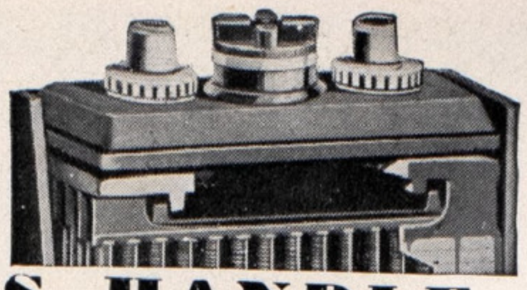
Staterooms are fitted with bronze mechanically operated windows. Those in exposed locations being water-tight in construction and windows in shelter spaces are wind and weather proof.

Bronze Rolling Ports of KEARFOTT design, are installed across the "B" Deck forward.

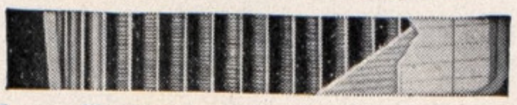
Permanent Windscoops of stainless steel that can be folded back out of the way when not in use are a fixture on many ports.

KEARFOTT ENGINEERING COMPANY, Inc.,

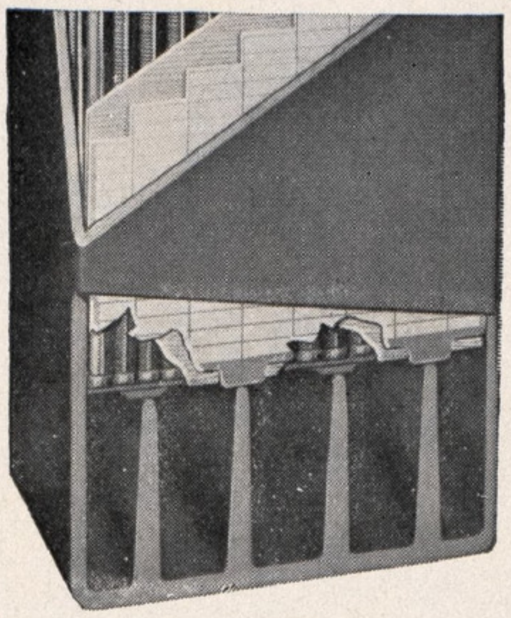
117 Liberty Street New York



EXIDES HANDLE 27 JOBS



ON ALL TYPES OF COMMERCIAL VESSELS



From tugboat to ocean liner, there's an Exide Marine Battery to do every kind of job, with dependability and economy

CLIP COUPON for interesting booklet, "Exide Batteries for Commercial Vessels." It illustrates and describes the numerous jobs that Exides do on every kind of craft, and covers, comprehensively, the Exide Marine Floating Battery System. You'll find it interesting.

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

Exide
BATTERIES
FOR EVERY MARINE USE

MAIL THIS COUPON TODAY

THE ELECTRIC STORAGE BATTERY CO. M.R.-2
Advertising Dept., Philadelphia, Penna.

Gentlemen:

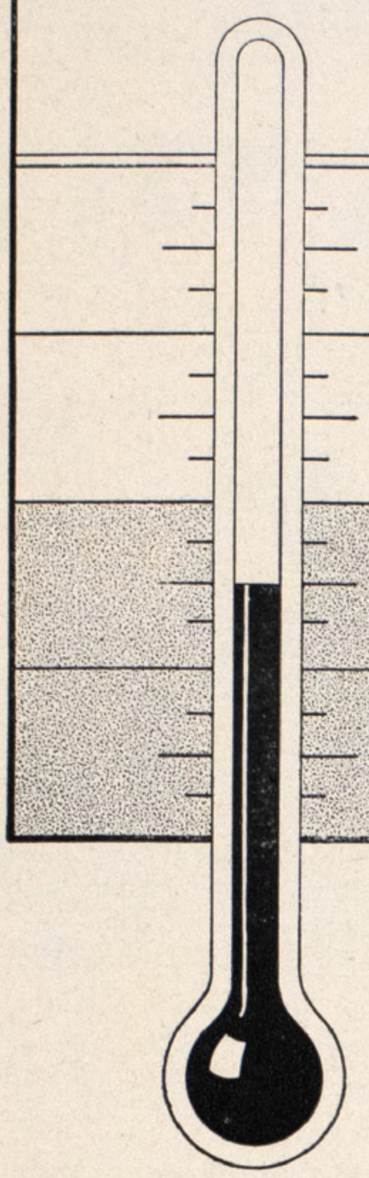
Please send me booklet, "Exide Batteries for Commercial Vessels." It is understood this request will not bring salesmen to call on me. If I should be interested further, I'll let you know.

NAME.....

ADDRESS.....

CITY.....STATE.....

Modern Steam



PRESSURE *POUNDS PER SQ. IN.*	TEMPERATURE *DEGREES Fahrenheit*	FUEL RATE *LB. OIL PER S. H.P. PER HOUR*
900	900	.50
600	800	.55
400	750	.60
200	500	.90

Higher Pressure
Higher Temperature
Lower Fuel Cost

THE tabulation above illustrates the approximate relation existing between pressure, temperature, and fuel rate. The lower shaded section of the scale is plotted directly from operating records of ships in service, while the upper section is based on pressures, temperatures, and equipment used in the stationary field but adapted to marine use.

The advantages of Modern Steam and Old Steam are clear and striking. With Modern Steam the fuel rate is low and the reduction in fuel cost is large. For example, from 200 to 400 pounds, there is a reduction of 33⅓% in fuel rate . . . and in fuel cost. Such a large saving in operating cost is not only important, but should command the interest of every naval architect, owner, and operator. The chart also shows the possibilities for still greater economies through the use of steam at even higher pressures and temperatures . . . higher than those adopted for marine service up to the present time. No recognized propulsion system holds such truly remarkable possibilities for further savings.

A recent report of the American Bureau of Shipping states that for all ships of 2,000 horsepower or over built during the past two years, more than 89% of the total power is steam. The American Marine Industry thinks clearly and leads the world in the recognition and in the adoption of true financial economy through the use of Modern Steam.

THE
BABCOCK & WILCOX
COMPANY

85 LIBERTY ST. NEW YORK, N. Y.

M-35

AGAIN—THE NAVY CHOOSES CORY

The photograph above shows the U. S. S. Northampton, built by the Bethlehem Shipbuilding Corporation, Ltd., and sister ship to the four cruisers now building.

FOUR 10,000 ton cruisers are to be built by the United States Navy Yards. On these ships only equipment of the most advanced type is to be installed.

The Navy has selected Chas. Cory Corporation to design and build Engine Order Telegraphs, Rudder Angle Indicators, Fire Room Telegraphs, Speed Flags, and similar equipment. This Contract has been awarded for the same reason that has made Cory the choice of the marine industry for the past ninety years: *Excellence of design.*

The United States Navy is a Cory customer of eighty years' standing. For lighting, signalling, and communicating equipment you, too, should choose Cory. Write for information and prices.

CHAS. CORY CORPORATION

DIVISION OF BENDIX AVIATION CORPORATION

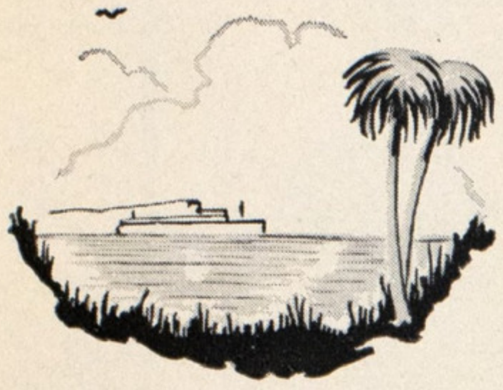
68-76 King Street

New York City

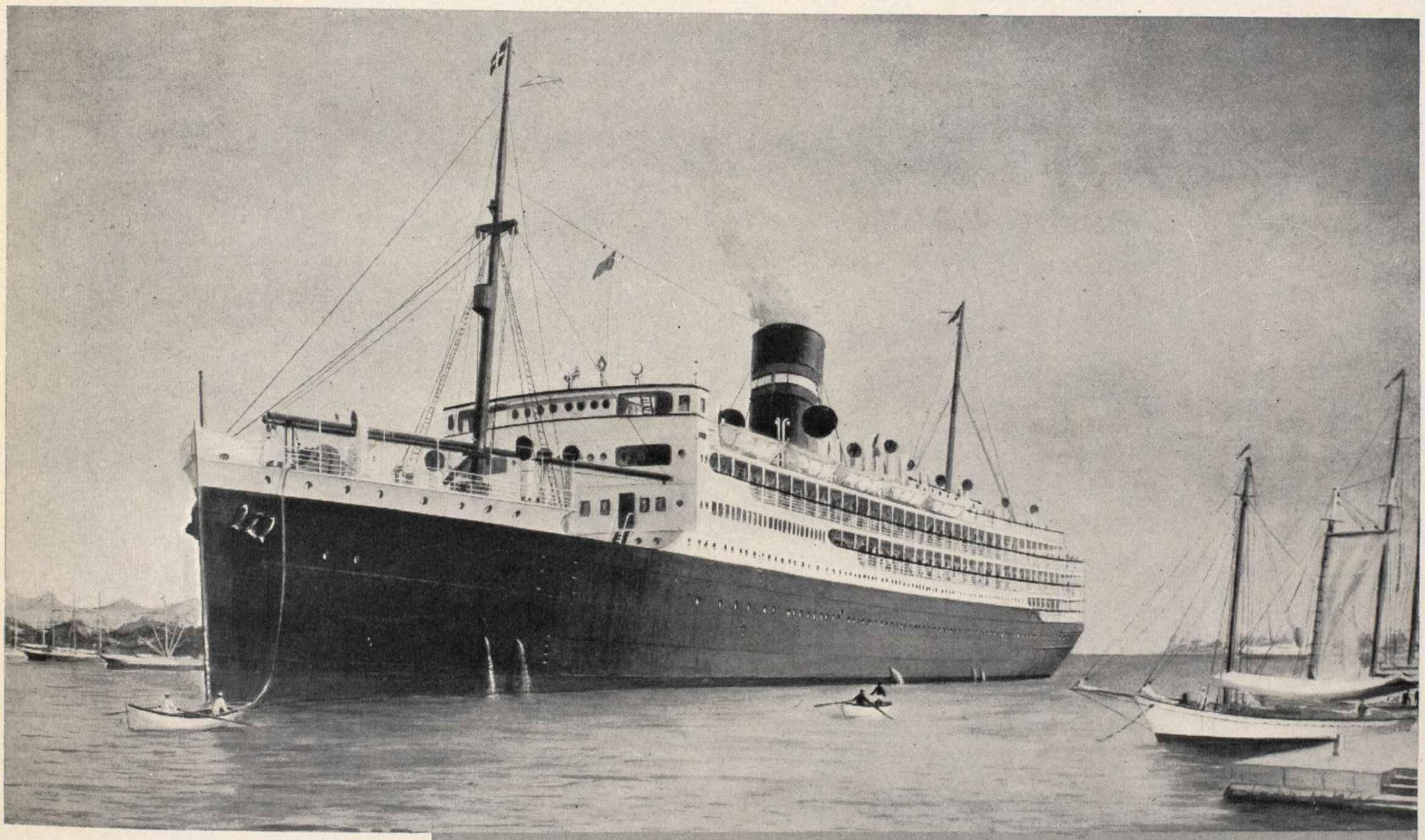
28 OUT OF THE 32 SHIPS SHOWN IN THIS SECTION ARE CORY EQUIPPED

S. S. BORINQUEN

BUILT AT FORE RIVER PLANT



S. S. Borinquen, splendid new flagship of the Porto Rico Line, has just sailed on her maiden voyage from New York to San Juan, Porto Rico, and San Domingo, Dominican Republic . . . . . The Fore River Plant at Quincy, Massachusetts, where the Borinquen was built, has a history of many years of service to shipowners in the construction of vessels of all types . . . . . Impressive of the extent of this service are the many vessels built by Bethlehem —a large and steadily-growing list to which the Borinquen is a noteworthy addition.



Dimensions: Length O. A. 429′. Length B. P. 414′. Beam 59′ 6″. Displacement 11,000 Tons. S. H. P. 6500.
Speed 16 Knots. Passengers 1st Class 261, 2nd Class 96.

BETHLEHEM SHIPBUILDING CORPORATION, LTD.

BETHLEHEM, PA.

General Sales Offices:

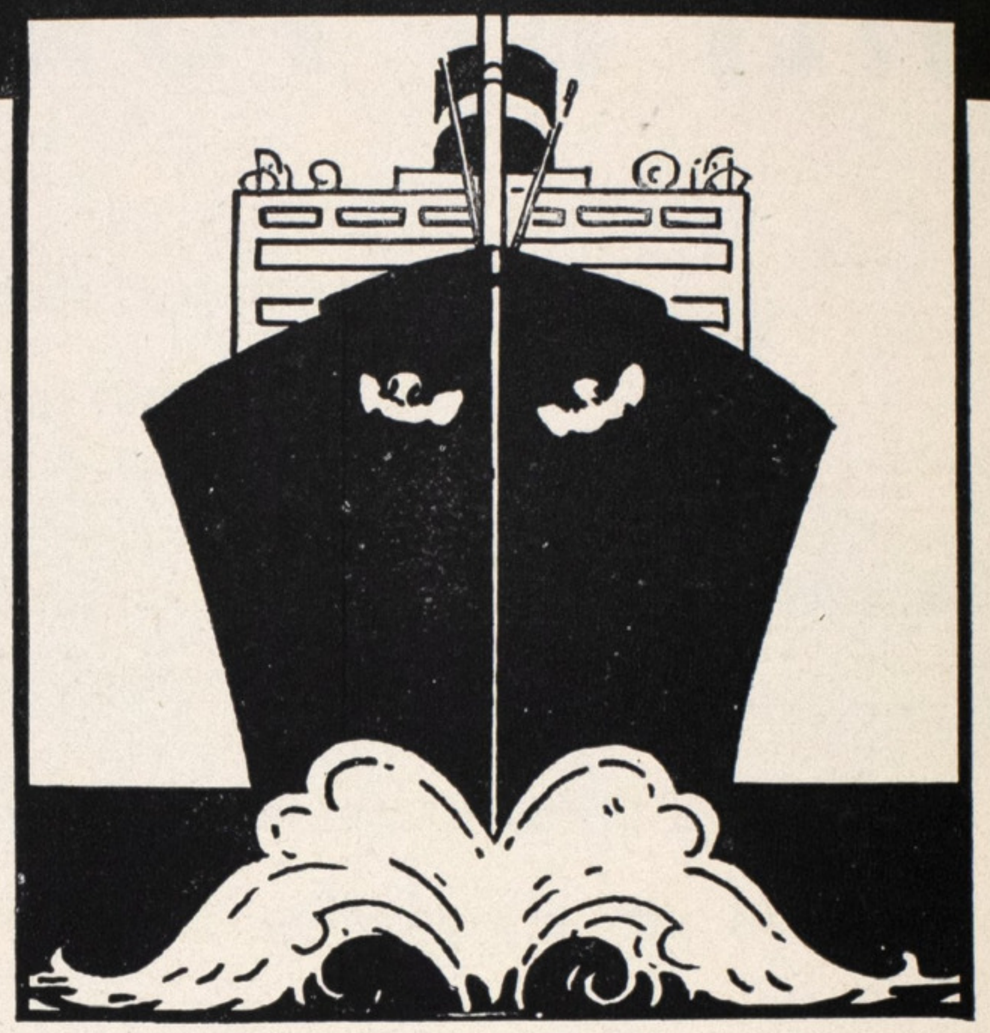
25 Broadway, New York City
20th and Illinois Sts., San Francisco

District Offices in Boston, Baltimore, and San Pedro

BETHLEHEM

SHARPLES STILL HOLDS THE RECORD FOR OUTSTANDING MARINE CENTRIFUGAL INSTALLATIONS

1930 *was* a Sharples year! And 1931 unquestionably *will be* another Sharples year. With but very few exceptions, Sharples Super Centrifugals have been selected and installed on America's most important ships launched or placed in commission during the past year. There is a good reason for this enviable record: *Unequalled Centrifugal Performance on the High Seas.*



A FEW OUTSTANDING SHARPLES TRIUMPHS

M. S. "CITY OF NEW YORK"
Largest Diesel passenger and freight ship ever built in this country. (*American South African Line*)

S. S. "G. HARRISON SMITH"
S. S. "W. S. FARISH"
These two ships are the largest steam-propelled tank ships ever built in this country. (*Standard Shipping Co.*)

"HERBERT HOOVER"
Most powerful Diesel Tug ever built in this country.

TIDEWATER OIL COMPANY
M. S. "Tidewater Associated"
M. S. "Tidewater"

SUN OIL COMPANY
M. S. "Chester Sun" M. S. "Western Sun"
M. S. "Eastern Sun" M. S. "Northern Sun"

EXPORT S. S. COMPANY
S. S. "Excalibur" S. S. "Exeter"
S. S. "Exochorda" S. S. "Excambion"

STANDARD TRANSPORTATION CO.
M. S. "Brilliant" M. S. "Daylight"

WARD LINE
S. S. "Morro Castle" S. S. "Oriente"

MATSON NAVIGATION CO.
S. S. "Mariposa" S. S. "Monterey"
S. S. (*Unnamed as yet*)

GRACE LINES
S. S. "Santa Clara"

NEW YORK & PORTO RICO S. S. CO.
S S. "Borinquen"

U. S. NAVY
U. S. Cruiser "Salt Lake City" U. S. Submarine "V-6"
U. S. Cruiser —— U. S. Submarine "V-7"
U. S. Cruiser —·—— U. S. Submarine ——

U. S. NAVY YARD—PORTSMOUTH, VA.
YACHTS

M/Y "Cambriana" M/Y "Nakhota" M/Y "Reene"
M/Y "Lotosland" M/Y "Intreped" M/Y "Aras"

THE SHARPLES SPECIALTY COMPANY, 2338 WESTMORELAND STREET, PHILADELPHIA. Boston, New York, Pittsburgh, Chicago, Detroit, Tulsa, San Francisco, Los Angeles, Toronto. Factories in England and France.

SHARPLES

CENTRIFUGAL ENGINEERS • • PHILADELPHIA

More Earnings For Owners of Cargo-Carrying Craft

TRUSSWELD—*minimum investment for maximum carrying capacity*

OWNERS of oil tankers, lighters, derricks, car floats and barges are adopting the new TRUSSWELD system of construction for craft carrying liquid cargo in the hold or dry cargo on deck.

Owners approve the economy of craft so constructed for first cost, maintenance and operation. For shoal water use, equal carrying capacity is attained with less draft. Less power is required for propelling or towing.

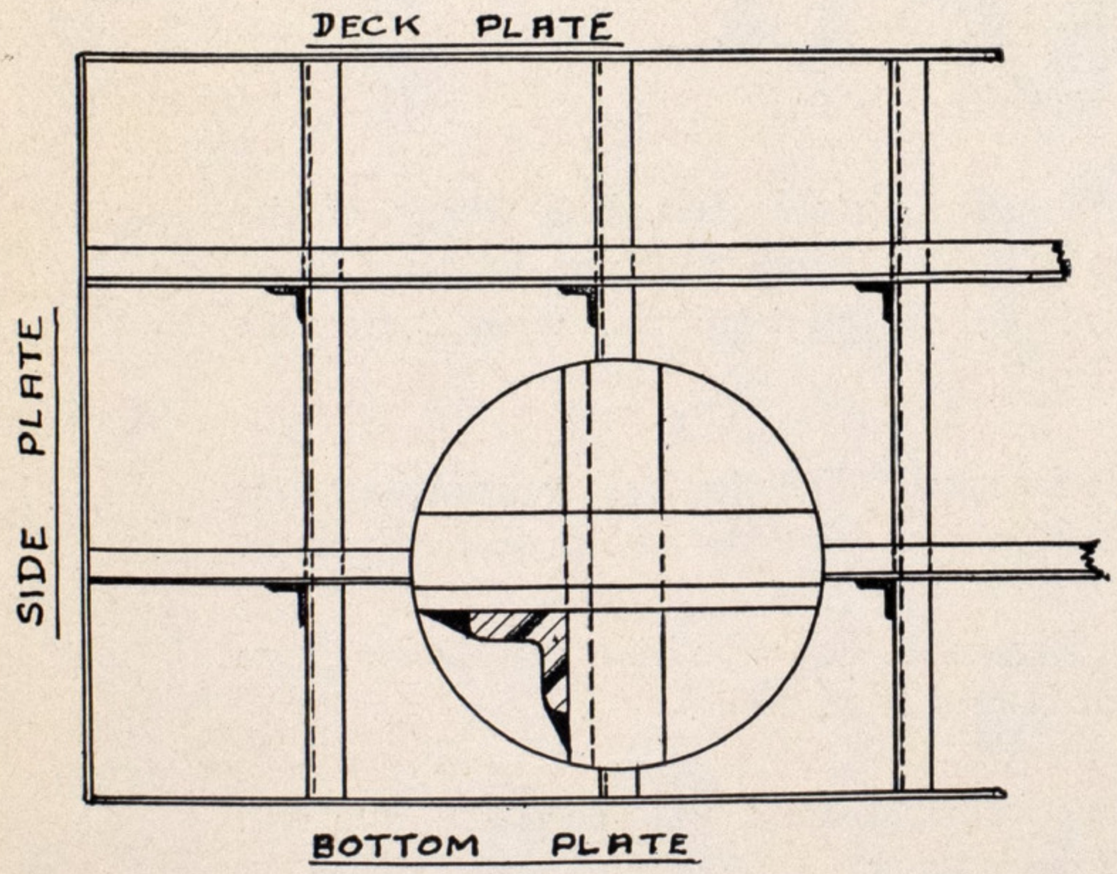
These advantages are secured by maximum carrying capacity for minimum hull weight. The TRUSSWELD system eliminates all riveting and practically all heavy members such as keels, ribs, beams and even frames. It produces a stronger and more rigid craft of greater capacity for its dimensions.

The superiority of TRUSSWELD over all other systems of steel construction is being demonstrated in vessels operated by some of the world's largest owners of tanks and barges. For certain types of craft, TRUSSWELD may often replace wood construction where cost is a primary consideration.

The REVERSE CHANNEL system lapwelded—no butt welds

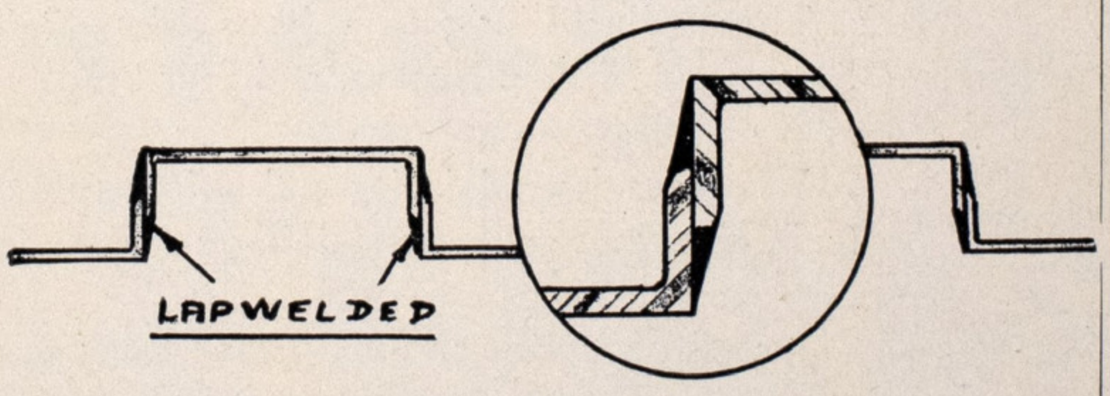
For carrying dry cargo below decks, the new REVERSE CHANNEL system assures great strength and rigidity of hull construction; maximum carrying capacity for minimum hull weight; economy of first cost, maintenance and operation.

United Dry Docks, Inc.—exclusive Atlantic Coast licensee of Kjekstad patented TRUSSWELD and REVERSE CHANNEL Systems of tank and barge construction—is ready to figure, build and guarantee.



Midship section showing internal structure of angle iron members running fore and aft, athwartship and vertical, electrically welded to each other at intersections and to the skin of the hull. The enlargement in the circle shows a typical junction of three members

THE REVERSE CHANNEL SYSTEM



Enlargement in circle shows the lapwelding method

UNITED DRY DOCKS

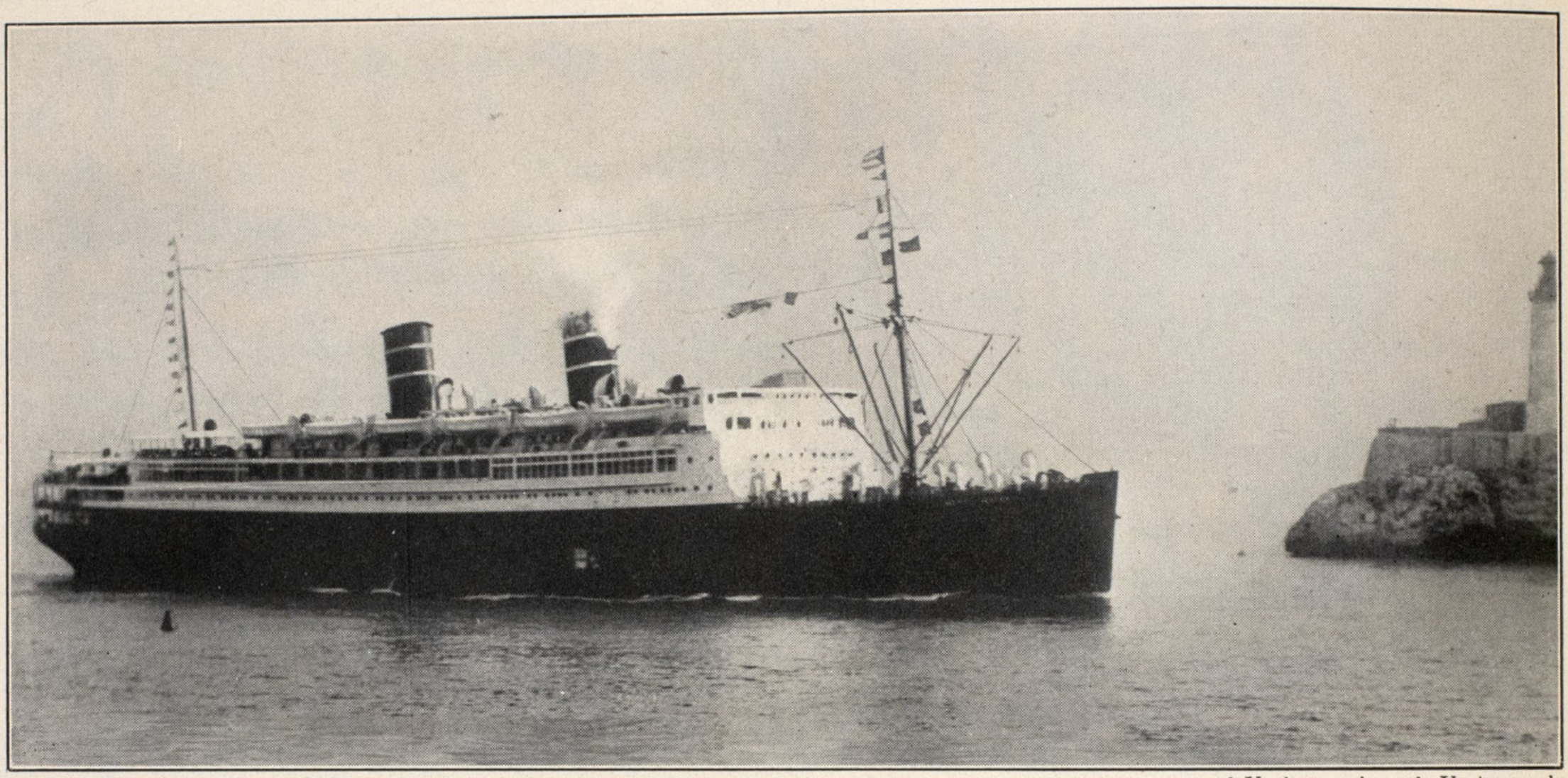
INCORPORATED

11 BROADWAY DIgby 4-0500 NEW YORK

Dependable

OUTSTANDING

Service



©Underwood and Underwood.

New Ward Liner "Morro Castle" passing the old fortress for which it is named.

ONCE again Sturtevant Fans have been chosen for the outstanding vessels of the year; the Ward Liners, Morro Castle and the Oriente, and the Dollar Liners, President Hoover and President Coolidge, are all equipped with Sturtevant Apparatus.

The new Ward Liners each have thirty-four Sturtevant Fans for hull ventilation, four fans for forced draft, and two Sturtevant Turbines to drive the two main feed pumps.

The Dollar Liners each have thirty-eight Sturtevant Fans for hull ventilation, two Sturtevant Marine Heaters and four Sturtevant Forced Draft Fans.

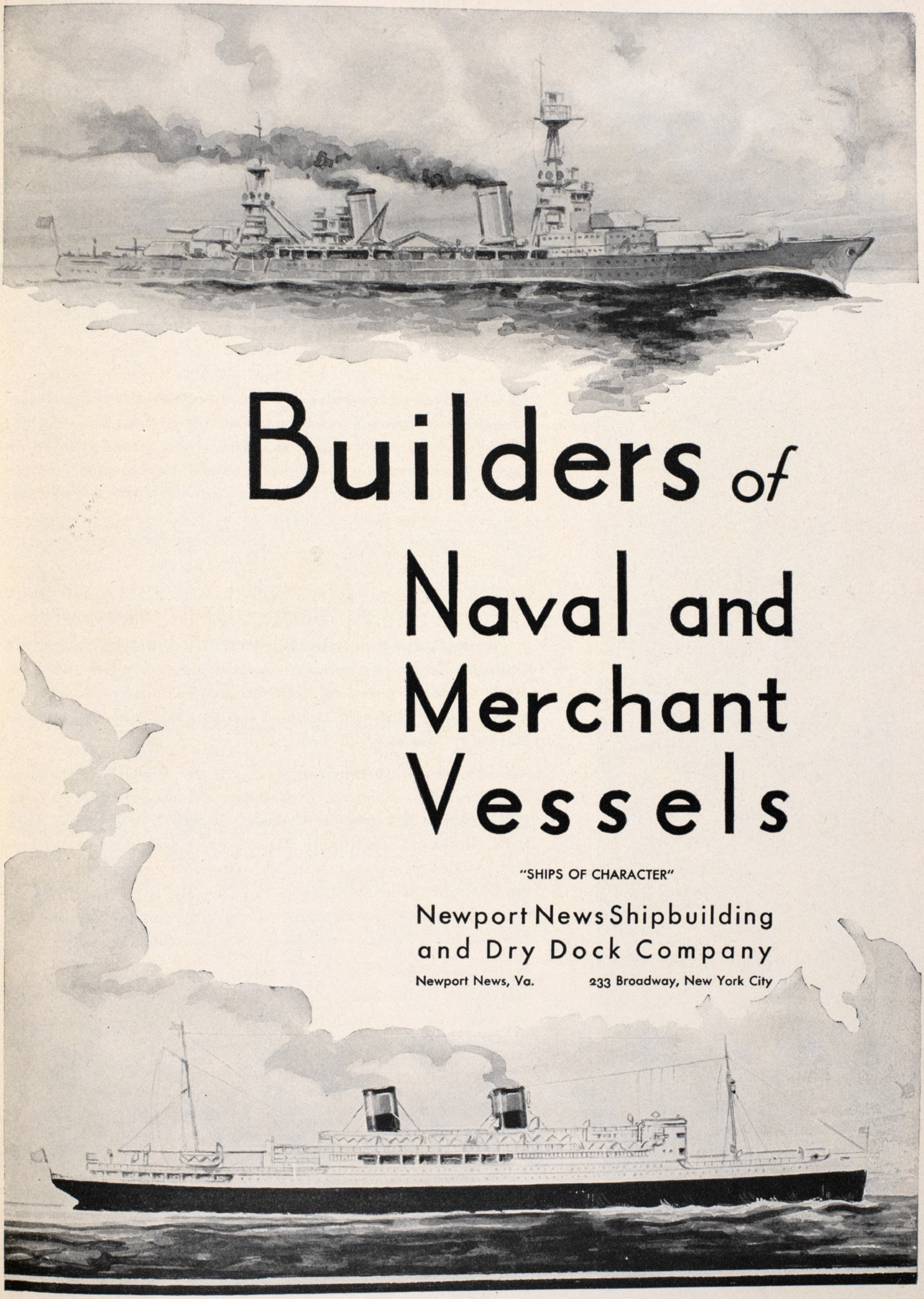
Wherever dependability and uninterrupted performance are a vital necessity, you will find Sturtevant equipment doing a real honest day's work.

Just drop a line to our Marine Department, concerning any air moving problem you may be up against, and our expert engineers will help you solve it.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

Sturtevant

REG. U. S. PAT. OFF.



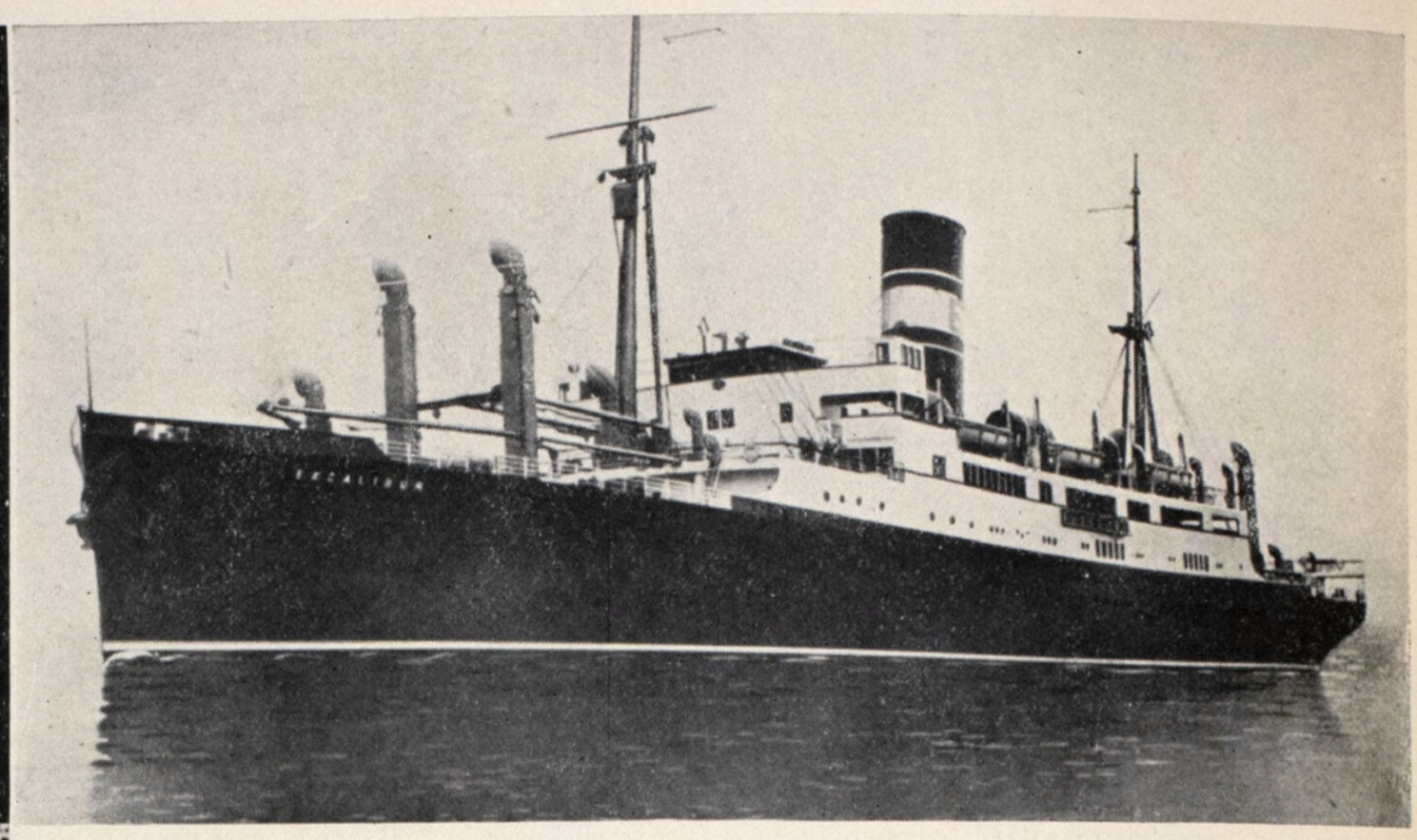
Builders of Naval and Merchant Vessels

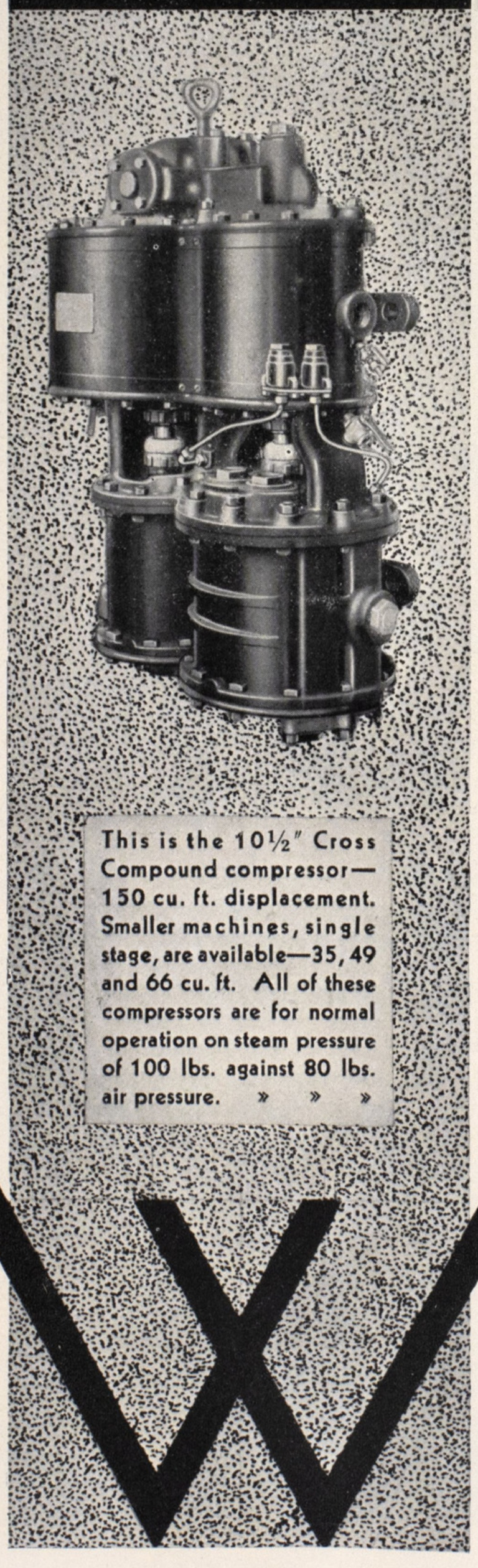
"SHIPS OF CHARACTER"

Newport News Shipbuilding and Dry Dock Company

Newport News, Va. 233 Broadway, New York City

Excalibur and SISTER SHIPS





This is the 10½" Cross Compound compressor—150 cu. ft. displacement. Smaller machines, single stage, are available—35, 49 and 66 cu. ft. All of these compressors are for normal operation on steam pressure of 100 lbs. against 80 lbs. air pressure. » » »

THE Export Steamship Company several years ago determined that with a source of compressed air aboard their ships they could remove rust and scale, paint the vessel, make emergency repairs, etc., much better and cheaper than by the old hand method. Consequently all of their sea-going vessels were equipped with Westinghouse steam driven compressors . . . So satisfactory was this practice that specifications for the four new boats, Excalibur, Exochorda, Exeter, and Excambion, included a similar machine, but of greater capacity—150 cu. ft. displacement.

A similar situation prevails with the Sinclair Navigation Company. Westinghouse compressors on many of their older boats have proved to be such a great convenience that they were specified for the new tankers Virginia Sinclair and Harry F. Sinclair.

Among other outstanding cases are the recently built coast guard cutters Saranac and sister ships, and fleets of the following steamship companies: Matson, Isthmian, A. H. Bull, Dollar, Lukenbach, Hausteca, Consolidated Navigation, Cities Service, and many other oil transportation and general shipping companies . . . Besides these hundreds of compressors on board ship, many are used on pile drivers, barges, etc., for harbor and dock maintenance work.

Westinghouse steam driven compressors are compact self-contained units, occupy no floor space, as they can be readily attached to a column or bulk head. They are reliable and durable machines.

WESTINGHOUSE-NATIONAL » » » AIR COMPRESSORS

Motor Driven Compressors

ALL TYPES AND SIZES

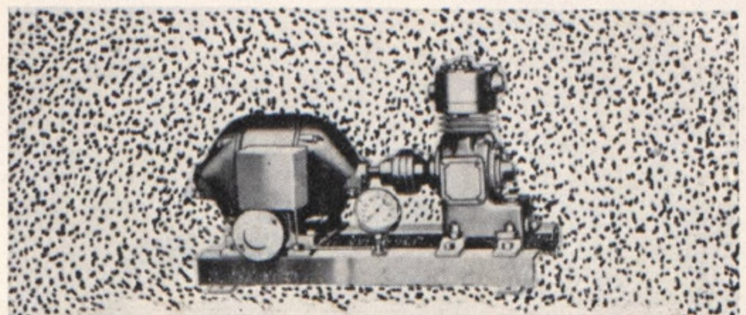
2½ to 700 cu. ft. displacement

(for pressures up to 350 pounds)

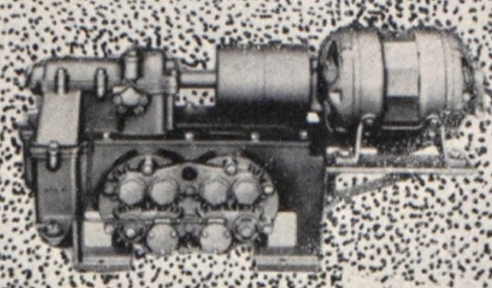
Where electricity is preferred to steam as the motive power, Westinghouse-National motor driven compressors also are being extensively employed for the "hundred and one" uses to which compressed air may be put in marine service—operation of pneumatic tools in ship yards and dry docks, starting Diesel engines on motor ships, operating hoists and clutch cylinders on dredges, operating scaling hammers and paint sprayers, blowing alarm whistles on boats and fog signals ashore, etc. These compressors are noted for their efficiency, economy of operation, and durability.

We also make the distinctive "Pneuphonic Horn," a compressed air alarm signal, for use on water craft, in light houses, etc., which produces a commanding sound of tremendous carrying power. Its tone is more harmonious than that of the ordinary bell whistle and the air consumption is very much less. It may be had as single horn, or in multiple horn combination to produce a pleasing though penetrating signal, clearly audible for many miles.

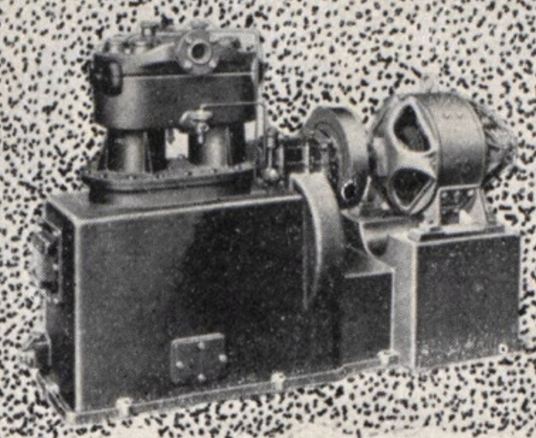
Write our nearest district office for complete information and catalogues.



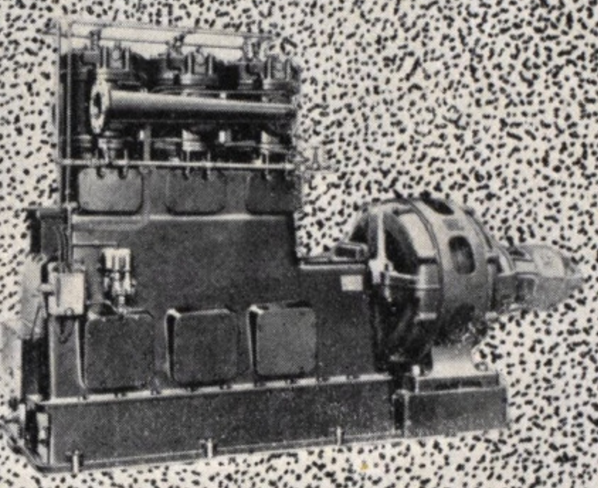
Type SV, 2½ - 22¾ cu. ft.



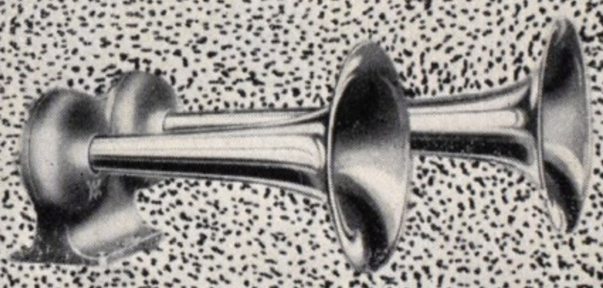
Type N, 12½ - 100 cu. ft.



Type 2V, 75-200 cu. ft.



Type 3VD, 560-727 cu. ft.



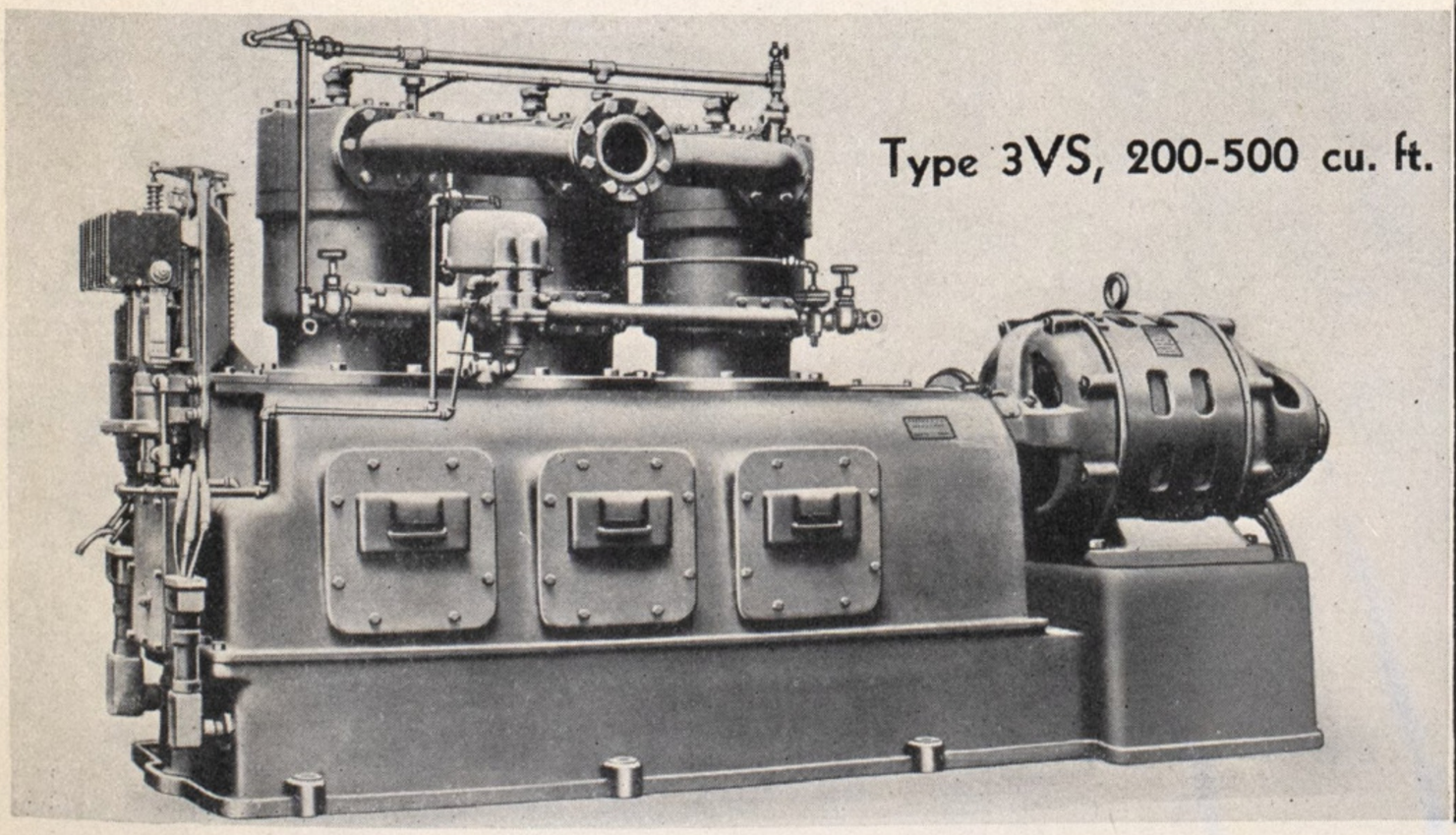
"Pneuphonic Horn"

WESTINGHOUSE TRACTION BRAKE CO.

INDUSTRIAL DIVISION

PITTSBURGH » » » » PENNSYLVANIA

CHICAGO » NEW YORK » ST. LOUIS » SAN FRANCISCO » WASHINGTON



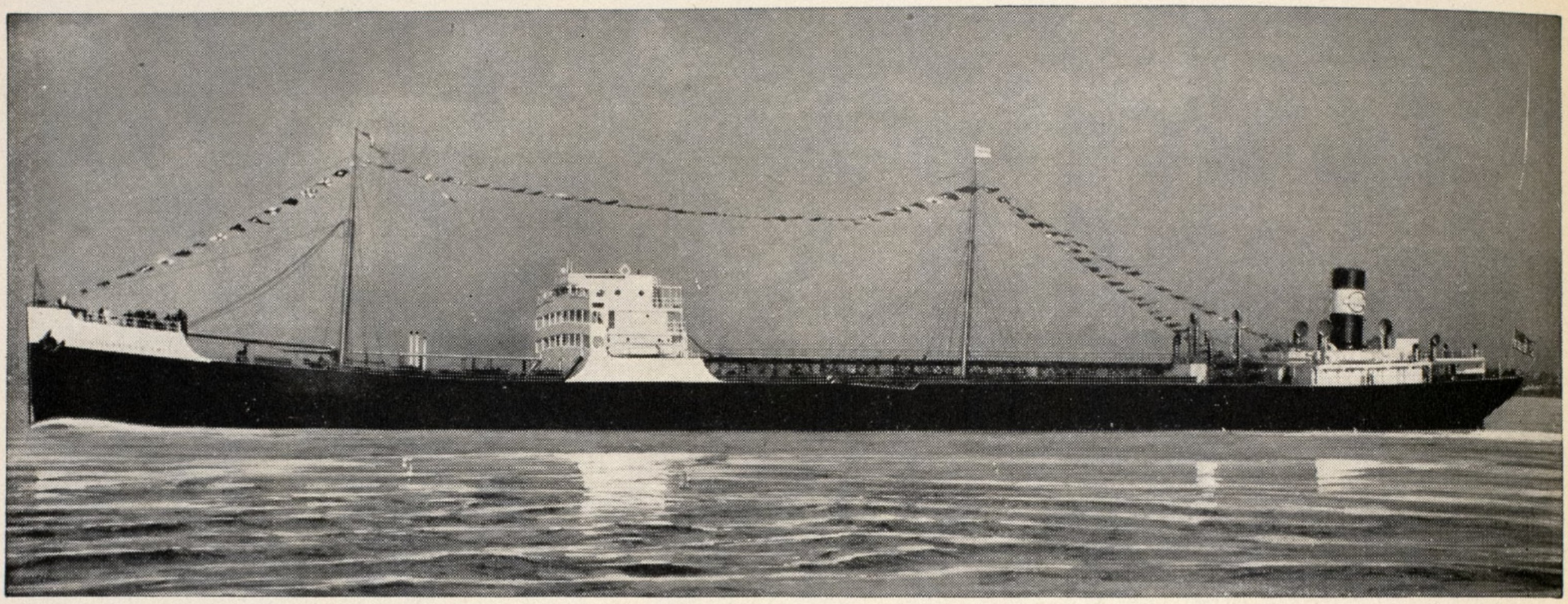
Type 3VS, 200-500 cu. ft.

"QUALITY" MACHINES

» » FOR « «

QUALITY SERVICE"

Latest American built Tankers of Standard Oil Co., of New Jersey



20,000 ton tankers "G. Harrison Smith" and "W. S. Farish" built 1930, by Federal Shipbuilding and Dry Dock Company

These tankers embody the very latest improvements in steam propulsion...high efficiency geared turbines, with water tube boilers, designed for 400 lbs. pressure, 750° temperature The fuel consumption is about 0.60 lbs. per shaft horsepower hour for all purposes.

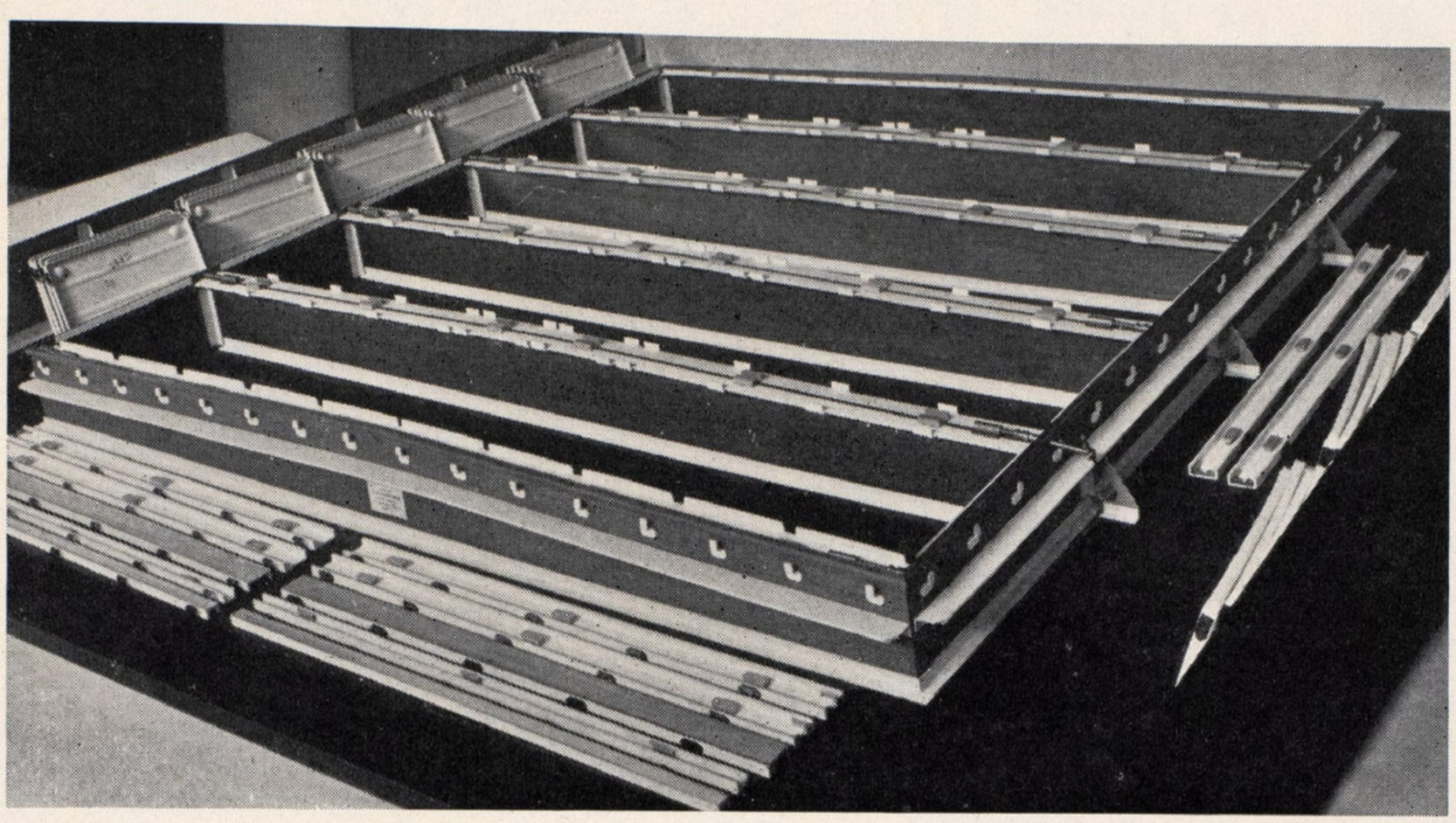
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

GENERAL OFFICES AND WORKS: LINCOLN HIGHWAY, KEARNY, NEW JERSEY

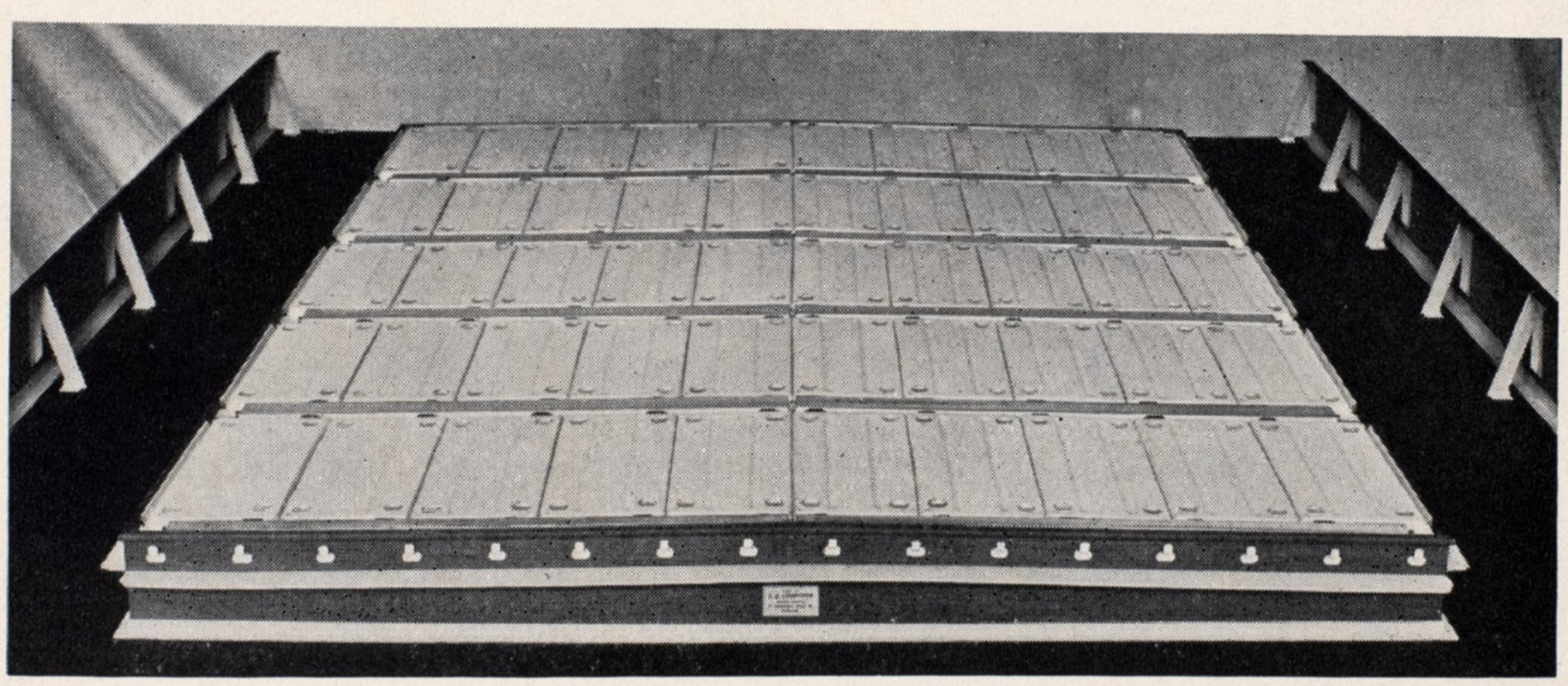
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

STEEL HATCHWAY COVERS

(ISHERWOOD PATENT)



Hatchway Open



Hatchway Closed

For further particulars and information apply to

Sir Joseph W. Isherwood & Co., Ltd.

17 Battery Place
New York City

4, Lloyd's Avenue
London, E. C. 3

(Proprietors also of Hogg-Car Hatchway Cover Patents and Isherwood Locked Wood Covers)

Greenheart Wood Solves Engineering Problem

U. S. Government
Experts Declare

For years American engineers have been searching for a strong sturdy wood which would not rot in soil or be destroyed by marine borers in water.

U. S. Department of Agriculture Forestry experts after intensive research and investigation located such a wood in British Guiana.

It is called GREENHEART.
The Government Engineers Officially report and declare
That "GREENHEART is unsurpassed as a construction timber."

That "The unusual Qualities of GREENHEART are manifested particularly in its structure, its great weight, its superlative strength and its great durability."

That "Authentic records show that the best grades of GREENHEART surpass iron and steel in durability when placed in water or in contact with the soil."

That "Its undoubted value to the engineering profession is exemplified by its numerous good qualities."

That "Its strength as a post or beam and its stiffness are considerably higher than that of the strongest and stiffest of the 130 North American woods so far tested at the Forest Products Laboratory."

That "It contains heartwood that is almost immune to decay, and which is probably more resistant to the teredo and other marine borers than any of the hundreds of species of timber so far used as piling."

That "On land it is exempt from attack of white ants."

That "In Europe it is generally considered of more value for lock-gate construction and piling than iron, or timber of other species."

That "It is the favorite wood for flooring, often lasting from 50 to 75 years without signs of wear."

That "The wood, moreover is remarkably free from knots, and generally sound."

That "It is said to be the strongest timber in use, with a crushing strength of 12,000 pounds per square inch, 65 per cent greater than that of English oak."

The statements quoted above are extracts from U. S. Government printed reports—Department of Agriculture circulars, etc. They are not statements of the producers.

No creosote treatment required.

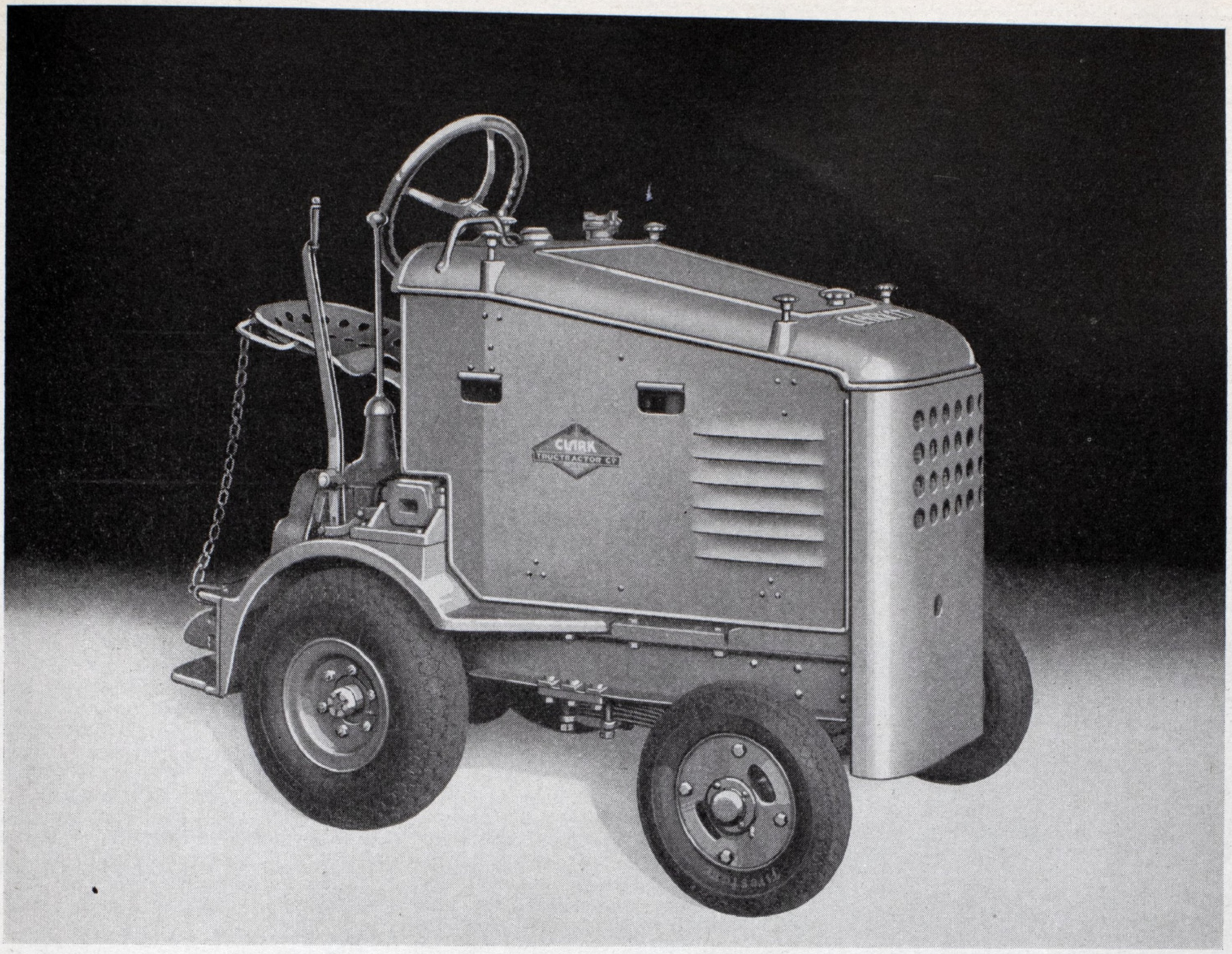
Recent tests by Columbia University Engineering Department show GREENHEART wood to be fire-resistant.

For further information address—

THE GREENHEART LUMBER COMPANY, INC.

70 Wall Street

New York City



A pushing, pulling little demon, now equipped with balloon tires, saving men and machines.

"Clarkat" rides on air!

The world's first pneumatic tired small industrial tractor is offered to the marine field for handling cargo on trailers. Its 2000-lb. draw bar pull enables it to tow 25 trailer tons on the level.

Its turning radius of 92 in. makes it possible to worm its way in 'tween deck space, through narrow openings, along crowded wharves. Spring suspended in front, rubber insulated at the rear, the entire unit rides on four balloon tires. Puncture-proof inner tubes are standard equipment.

"Clarkat" will whisk the cargo ashore quickly, at low cost. It will speed loading—get the ship away on another trip with minimum time lost in port.

Special Note!

Clark vehicles are gas-powered—therefore competent for 24 hour continuous service and just as potent the last hour as the first.

Clark 24-hr. continuous service

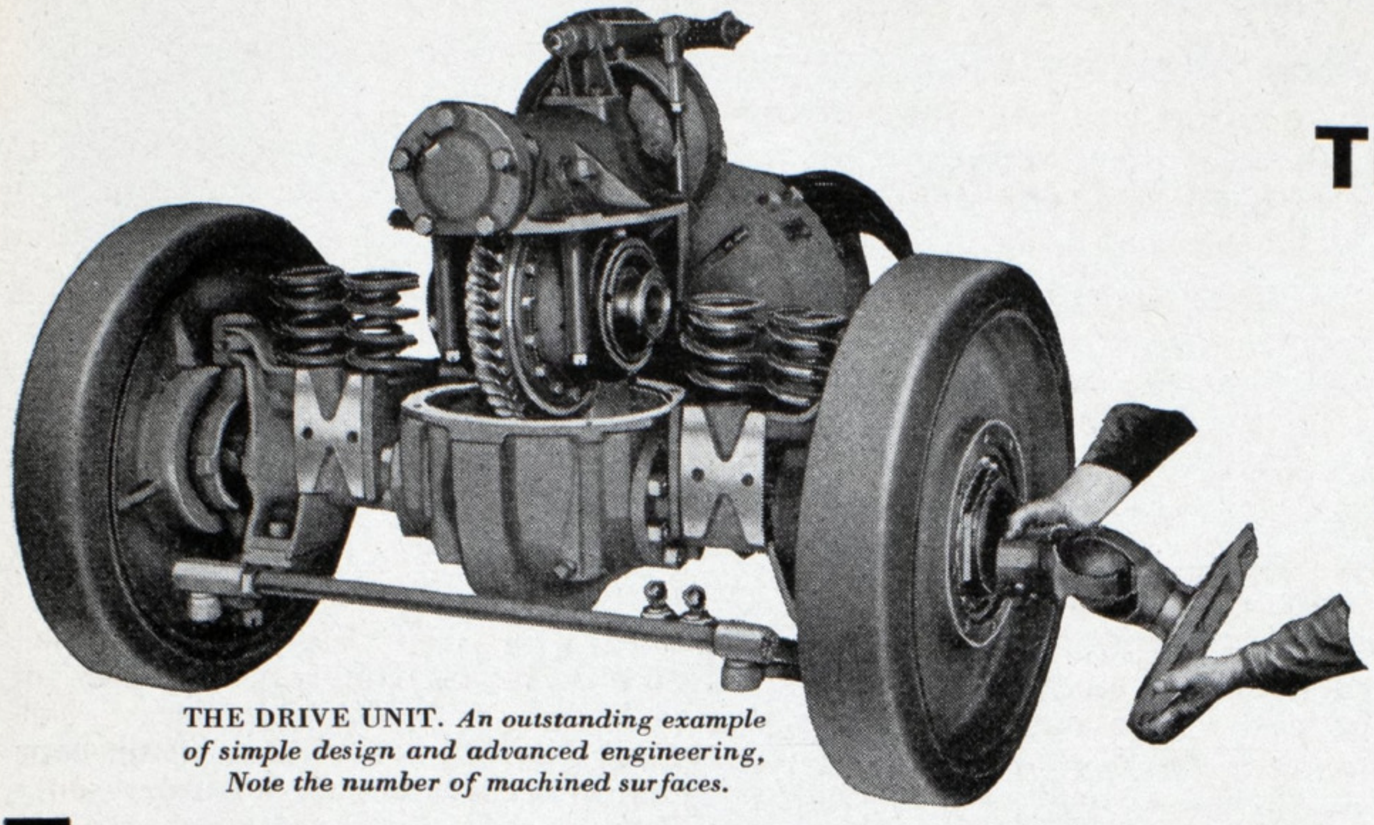
Ordinary 8-hr. service

Write for "Clarkat" Bulletin showing the performance of this perky towing midget and its train of trailers on rough going, up steep ramps and around sharp corners.

The Clark Tructractor Co.
Battle Creek, Mich.

Attach this ADVERTISEMENT to your inquiry

REFINED *DESIGN* MAKES THE ELWELL-PARKER AN EXTREMELY ECONOMICAL TRUCK



THE DRIVE UNIT. *An outstanding example of simple design and advanced engineering, Note the number of machined surfaces.*

There is an appearance of stability and fitness about Elwell-Parker Electric Trucks which even a casual glance reveals. Graceful curves. Solid balance. Pleasing proportions. Instinctively, you feel that all important units are fitted exactly where they belong—and have been coordinated into a smooth working unit.

Modern steels of the highest quality obtainable form the basis of Elwell-Parker design. Multiple heat-treating methods strengthen and toughen the parts, making possible a compact efficient design, with no cumbersome construction and needless weight to cause excess power consumption.

Engineers marvel at the Elwell-Parker's simplicity, its small number of parts, the high sustained efficiency of the worm gear drive, and the direct transmission of power to drive wheels and load.

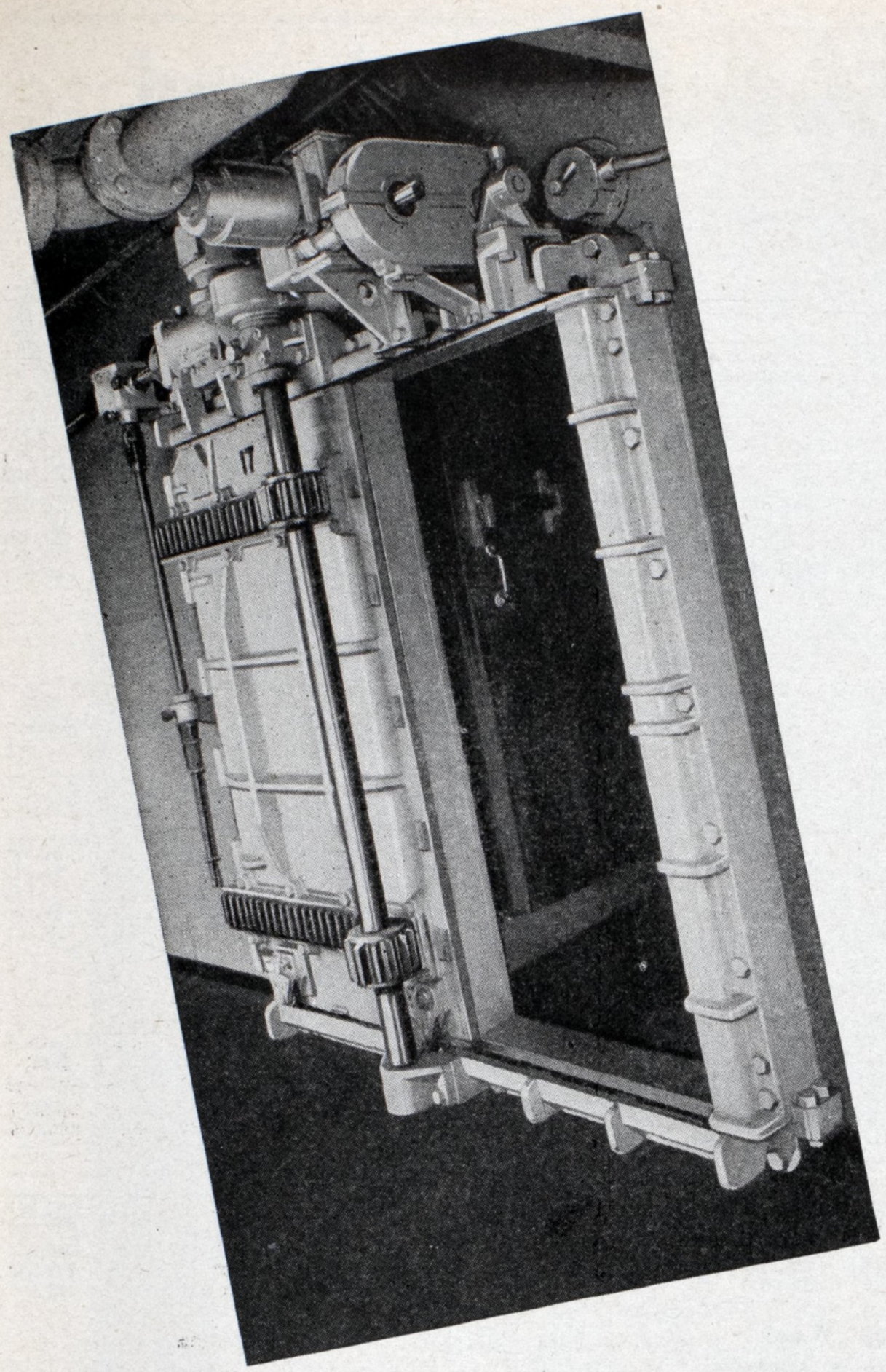
This kind of design plus a highly developed system of interchangeable parts gives you unusual quality at a surprisingly low price. It gives you exclusive operating advantages, a lower cost of depreciation and maintenance, and increased net profit from your electric truck investment.

You will think of these advantages many times after you have purchased an electric truck. Make sure of them *before* you buy. Specify "Elwell-Parker."

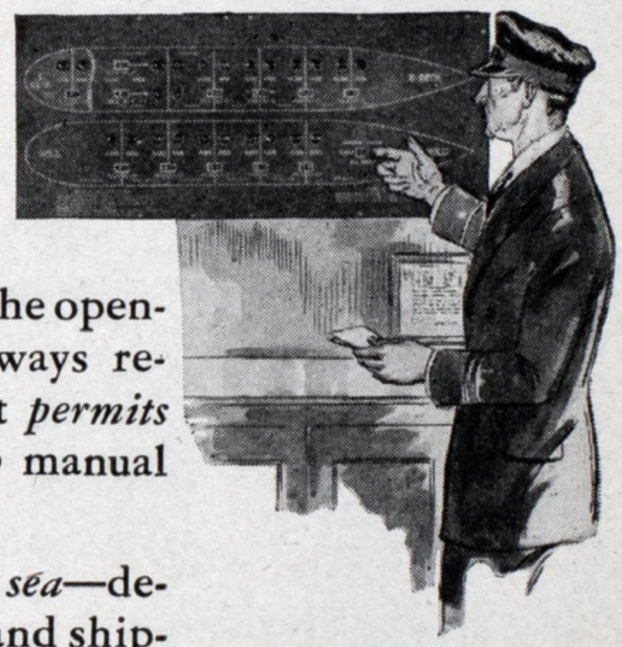
A Valuable Addition To Your Materials Handling Library. "Handling and Shipping on Skids" tells how scores of plants are increasing profits by handling materials on skid platforms with electric trucks. Illustrated with 75 photographs. Sent without obligation. Write The Elwell-Parker Electric Company, 4200 St. Clair Ave., Cleveland.

ELWELL-PARKER

DESIGNERS AND BUILDERS OF ELECTRIC INDUSTRIAL TRUCKS, TRACTORS AND CRANES FOR OVER A QUARTER CENTURY



CONTROL
that puts the Captain really IN COMMAND



The C-H Centralized Control Panel gives pilot-house control of every bulkhead door, and indicates with lights whether each is open or shut. Above at left is shown a water-tight bulkhead door on board the S. S. California of the Panama-Pacific S. S. Co. where C-H Bulkhead Door System is installed.

Are you acquainted with C-H Marine Motor Control?

Cutler-Hammer, out of three decades of marine experience, has built a complete line of Motor Control expressly for sea service—control for steering gears, pumps, ventilating fans, anchor windlasses, cargo winches, etc. One standard line meets all requirements.

ON liners, on freighters, on craft of every description—wherever there is a Cutler-Hammer Bulkhead Door Operating System—the captain gains new mastery of his vessel. He has *finger-tip* control of every bulkhead door. He is given *foolproof* control of those points below decks where the safety of cargo, crew and ship is concentrated. Protection—in *any* crisis!

The Cutler-Hammer Bulkhead Door System provides a master control panel in the pilot house which operates *all* doors—a panel which shows whether each door is open, closing or shut. Any door may also be operated independently from control stations directly at the opening. The master panel always reassumes control though it *permits and does not interfere with* manual or local operation.

Built specifically *for the sea*—designed by naval architects and shipbuilders—the Cutler-Hammer Bulkhead Door Operating System installs readily into new or remodeled ships. Meets every specification of the International Conference on Safety of Life at Sea. Ask for descriptive booklet "Modern Watertight Door Control". CUTLER-HAMMER, Inc., 1322 St. Paul Avenue, Milwaukee, Wisconsin.

CUTLER HAMMER

Motor-Driven Bulkhead Door Operating Systems

(A-4008)

COLUMBIAN TOW-RO

Strength and Durability Illustrated

A 2000 ton drydock section was towed from New York to the Todd Shipyards Corporation's New Orleans Dock—a distance of 1800 miles. During the journey, heavy weather was encountered, making the tow more difficult.

The Columbian Towing line gave perfect service and although the tug and tow were a little behind schedule, the tow was brought in safely.

Columbian Tow-Ro was built for this and any other types of towing. It may also be used as a spring line. Its qualifications are:—

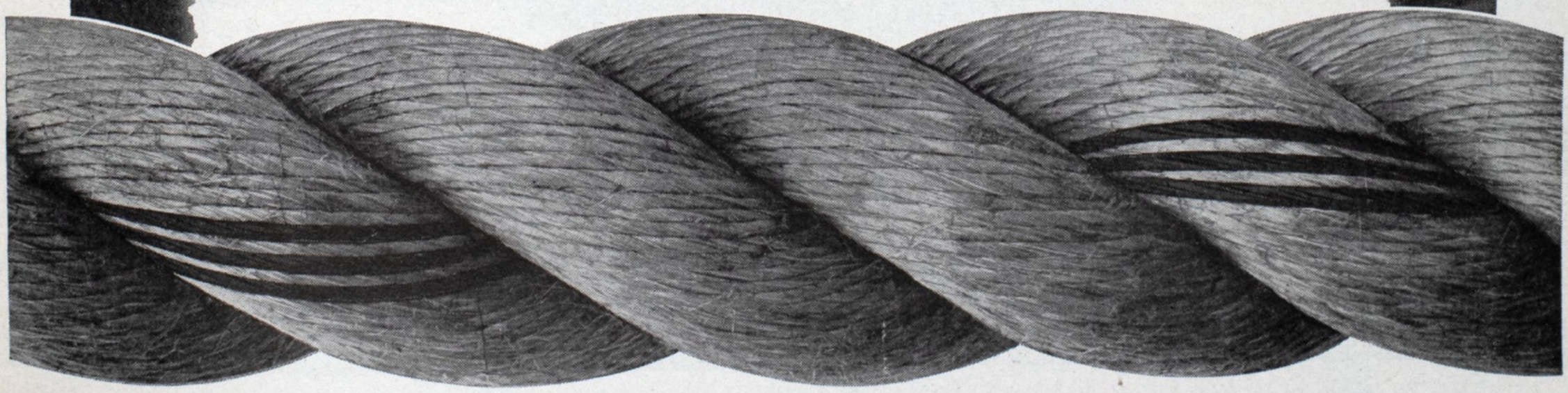
Tow-Ro is a new, patented construction.
It possesses super-strength and durability.
It is guaranteed.
It is waterproofed.
It is flexible without distortion and remains flexible, wet or dry.
It may be easily spliced.
It is readily identified by its red, white, blue, white and red surface markers.

For your toughest job, try Columbian Tow-Ro Pure Manila.

COLUMBIAN ROPE COMPANY

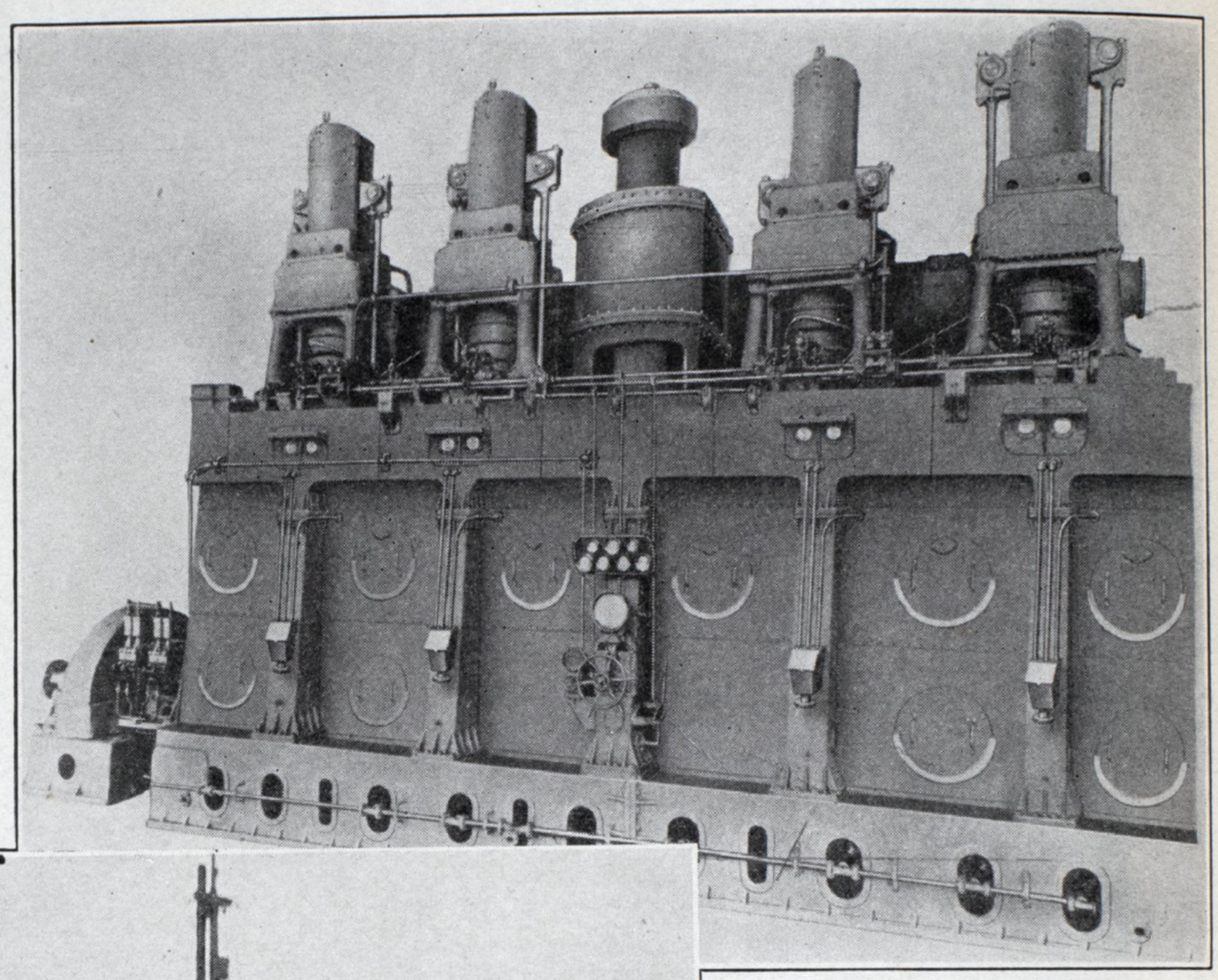
Auburn, N. Y., *"The Cordage City"*

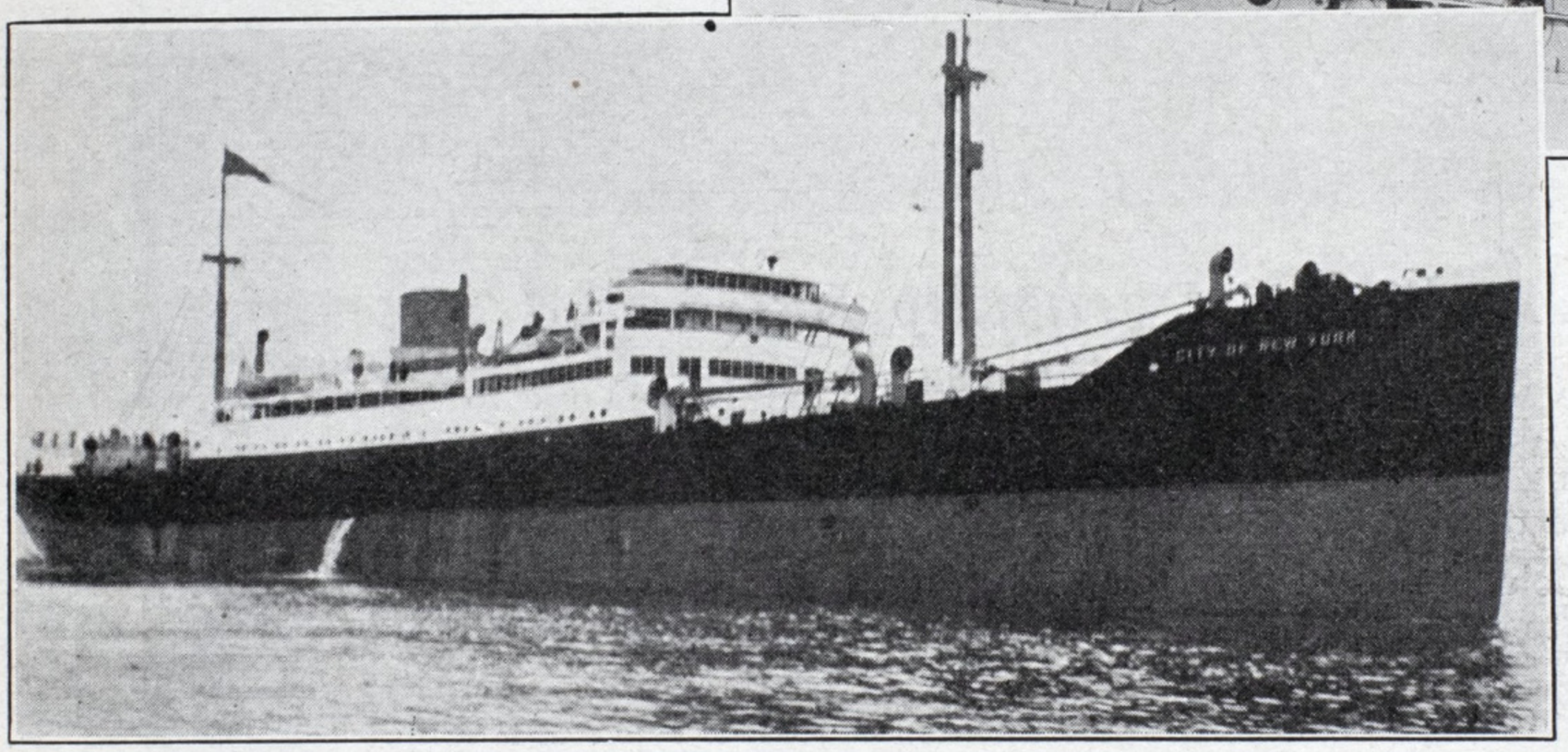
Branches:— New York Chicago Boston New Orleans Philadelphia



Power with Efficiency

SUN-DOXFORD Opposed-Piston DIESEL ENGINES





Many American Vessels are now equipped with American Built Sun-Doxford Diesel Engines built in the Sun Plant.

Builders of

Passenger and Cargo Vessels—Oil Tankers

Unlimited facilities for

MARINE REPAIRS

Two floating Dry Docks
11,000 Tons Lifting Capacity Each

DRYDOCKING AND REPAIRS

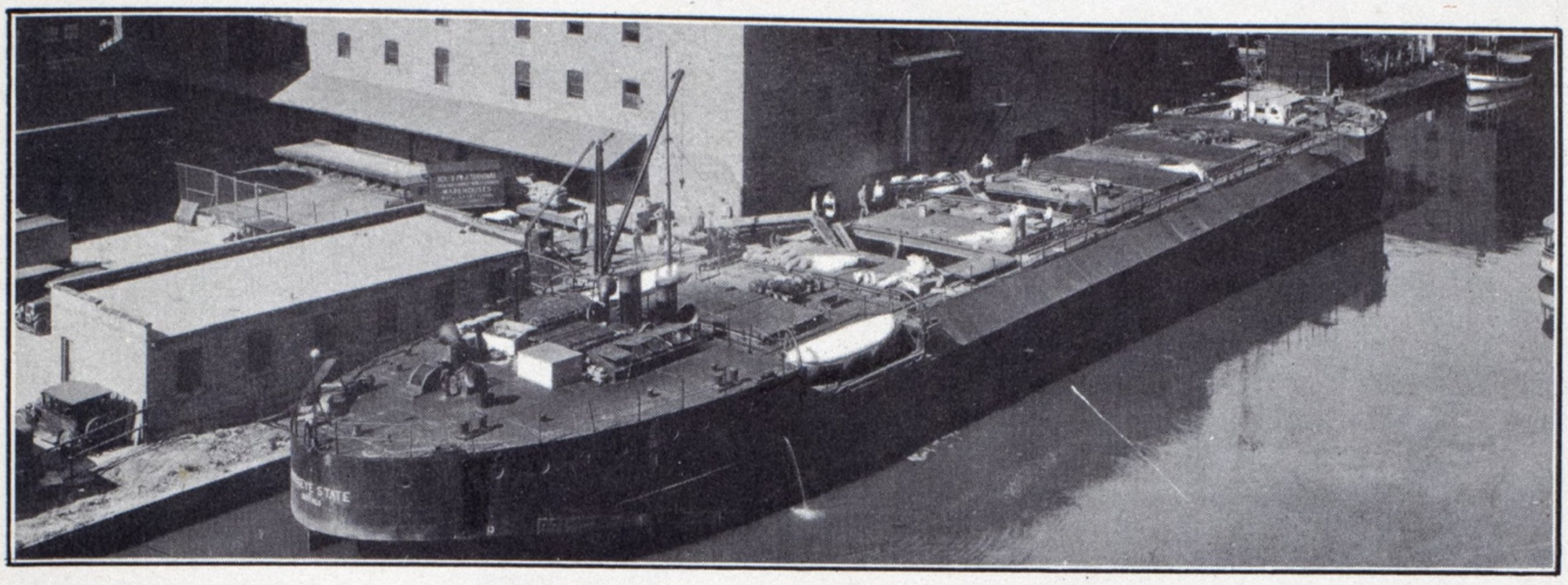
BUILDERS OF ALL TYPES OF VESSELS

SUN SHIPBUILDING & DRY DOCK COMPANY

Shipyard & Main Office
CHESTER, PA.

25 Broadway
NEW YORK

F-M Diesel Powered Barge makes Philadelphia-Chicago run in less than 10 days

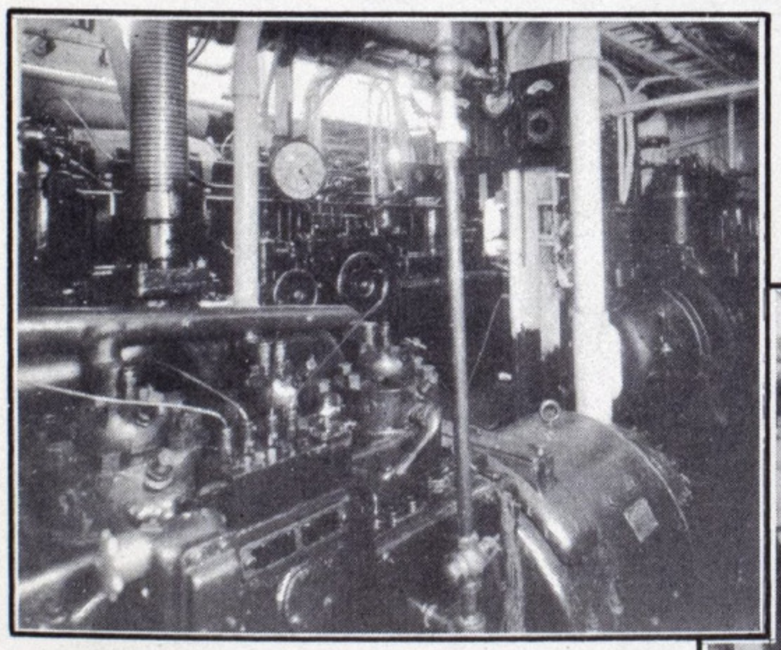


The "Buckeye State" unloading a cargo of sugar at Chicago

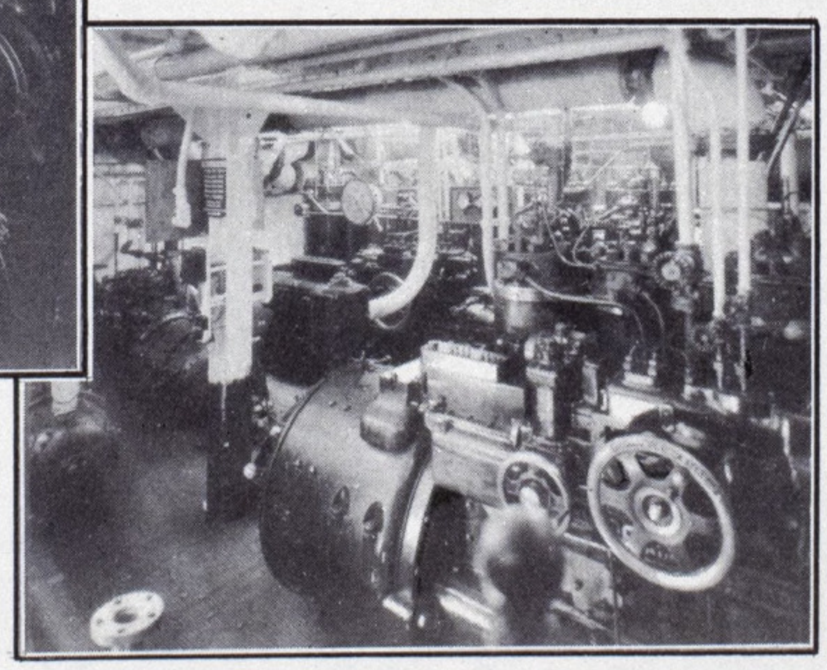
The "Buckeye State," a 246-ft. motor barge owned by the Federal Motorship Corporation, docked at Chicago with a 1750-ton cargo of sugar in less than 10 days after leaving Philadelphia. This time compares favorably with fast freight schedules and a most favorable freight rate was made possible by the remarkable economy of the F-M Diesel engines which drive the barge.

The "Buckeye State" is powered by two 6-cylinder, 400-hp. Fairbanks-Morse Diesels. Auxiliary equipment includes three F-M Generating Units, F-M compressors and Fairbanks-Morse Pumps.

Fairbanks-Morse Diesel Engines meet the peculiar requirements of this type of service admirably. They provide maximum power in small space and their economy of operation permits a good margin of profit.



Control side of the port main engine showing the F-M auxiliary generating unit in the foreground. Notice the compact yet accessible arrangement

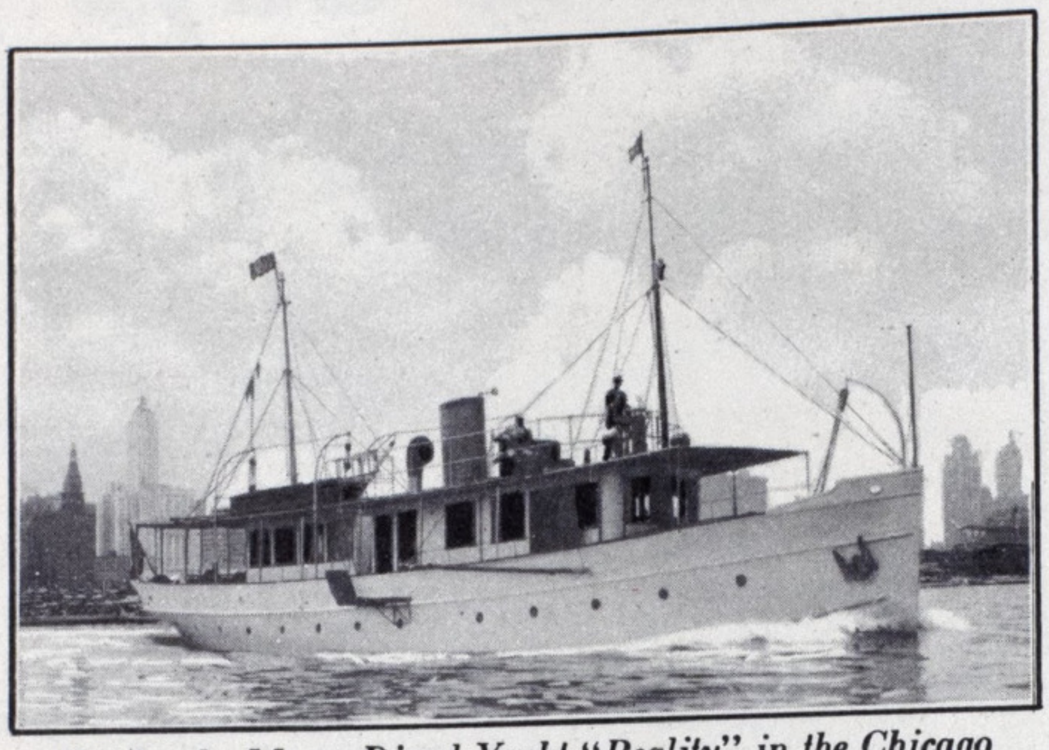


Control side of the starboard main engine and two of the three F-M auxiliary generating units

FAIRBANKS-MORSE
DIESEL ENGINES

POWER, PUMPING AND WEIGHING EQUIPMENT

Fairbanks-Morse Diesels chosen for reliability . . .



Fairbanks-Morse Diesel Yacht "Reality" in the Chicago Yacht Harbor

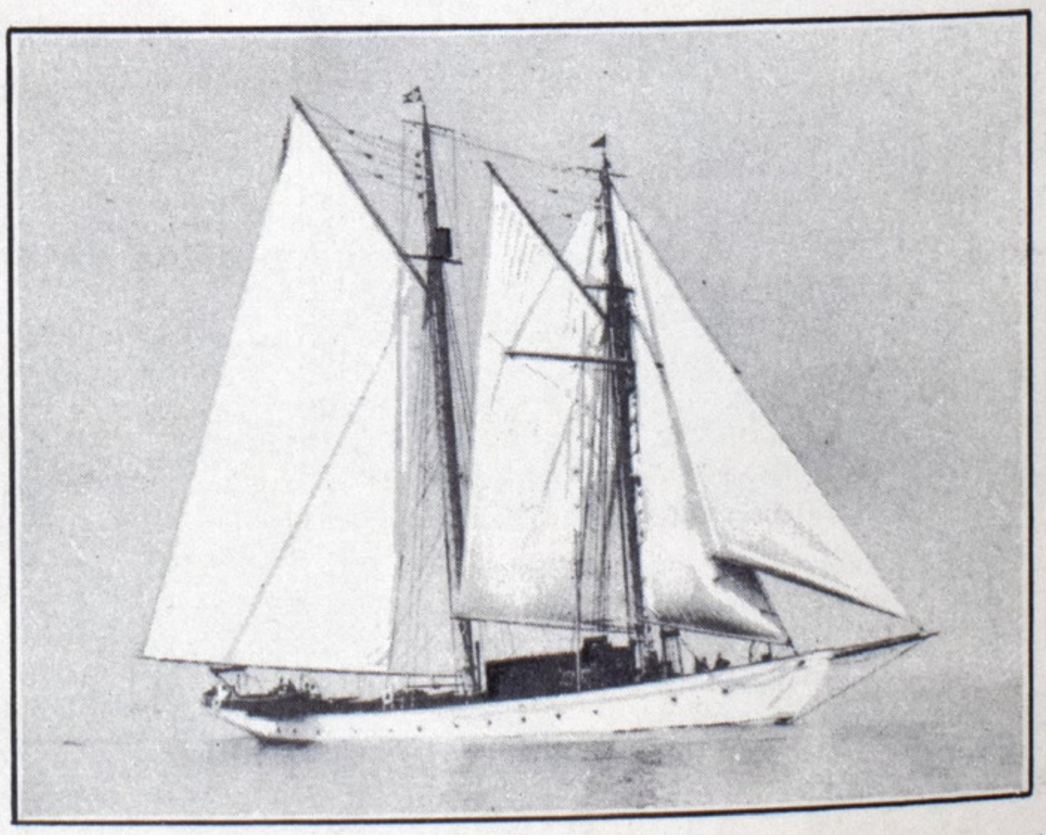
Typical instances of the choice of F-M Diesel engines for service where reliability is paramount are furnished by the two yachts illustrated on this page.

Mr. Karl Nibecker of Chicago, owner of the Yacht "Reality" which was built by the Manitowoc Shipbuilding Corporation of Manitowoc, Wisconsin, specified a 150-hp. Fairbanks-Morse Diesel after an exhaustive study of all prime movers that would be suitable for a craft of this kind. Auxiliary equipment includes two F-M Home Water Plants, an F-M Light Plant and a Fairbanks-Morse compressor driven by an F-M "Z" Engine.

In refitting the "Ouananiche," owned by Mr. Hudson, a 150-hp. Fairbanks-Morse Diesel was used to replace the original auxiliary power plant. Recurrence of power failure had impressed the owner with the importance of absolute reliability and the F-M Diesel was chosen because of its unequaled simplicity and enviable record of dependability.

FAIRBANKS, MORSE & CO., 900 S. Wabash Ave., Chicago
Branches and Service Stations in Principal Ports

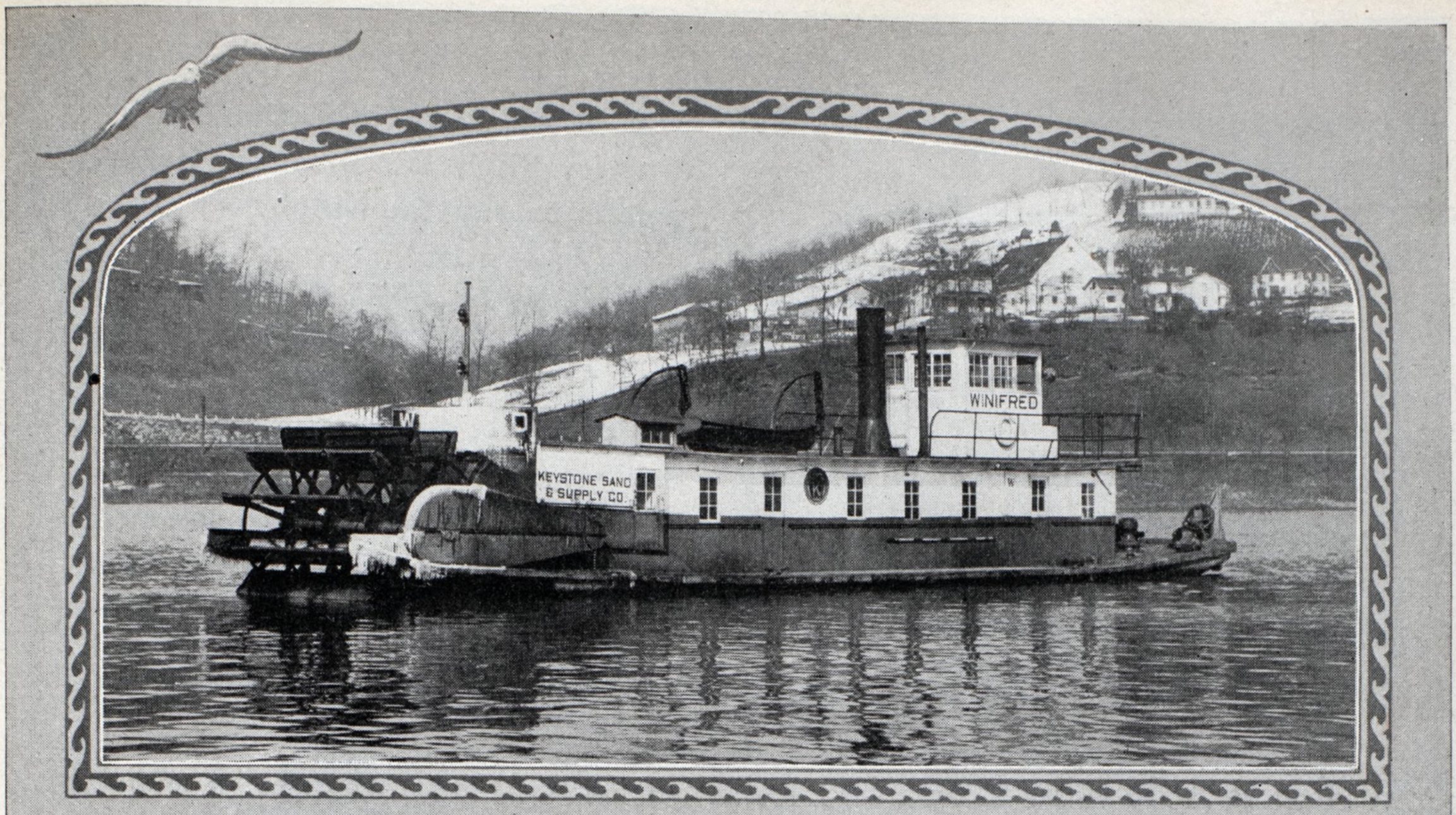
Yacht "Ouananiche" refitted with an F-M Diesel Engine



FAIRBANKS-MORSE
DIESEL ENGINES

OA27.342

POWER, PUMPING AND WEIGHING EQUIPMENT



WHEN PROFITS DEPEND ON POWER

The "Winifred", which is powered with a Cooper-Bessemer 150 H. P. marine diesel engine, was designed and built by The Dravo Contracting Company of Pittsburgh, Pa. A sister ship of the "Winifred", which includes the same advanced design and construction features, is completed and availiable for immediate delivery. These boats are 74' 2" long, 16' beam, and 4' deep.

THE power plant is one of the first factors in determining the profit of a work boat. Engines which can be depended on for a full day's work — every day — will assure an owner of a good return on his investment. Freedom from enforced shutdowns means elimination of expensive repairs and idle time for both boat and crew.

The towboat "Winifred", (pictured above), owned by The Keystone Sand and Gravel Company of Pittsburgh, Pa., depends on a Cooper-Bessemer 150 H. P. marine diesel engine for power. Although in service only six months, she has already demonstrated her reliability, and is kept busy tending dredges and handling sand barges up and down the river.

The three most desired characteristics of a good work boat engine are dependability, economy of operation and the delivery of full rated horsepower. You'll find them all in Cooper-Bessemer marine diesel engines.

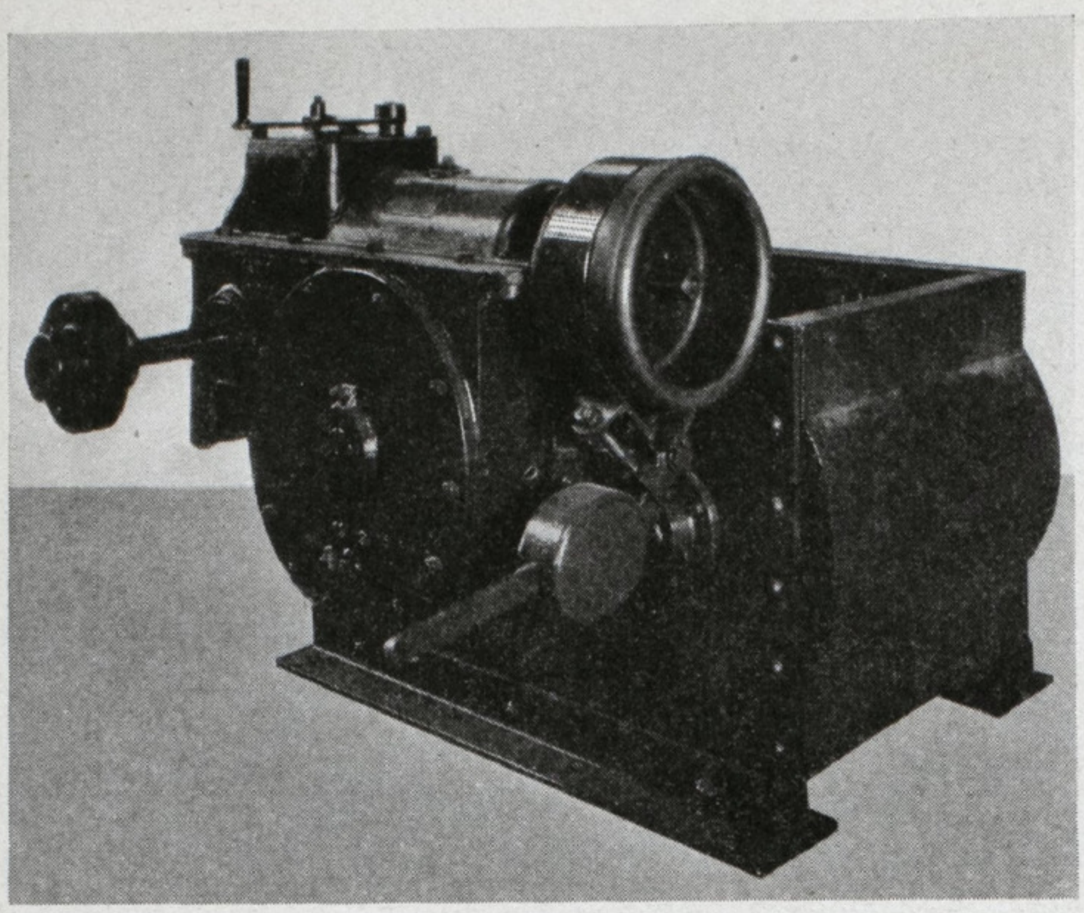
THE COOPER-BESSEMER CORPORATION

GENERAL DIESEL SALES OFFICES: SUITE 301, 25 W. 43rd STREET, NEW YORK CITY

131 State Street, *Boston, Mass.* 505 Esperson Building, *Houston, Texas* 640 East 61st Street, *Los Angeles, California*

PLANTS: MOUNT VERNON, OHIO GROVE CITY, PENNSYLVANIA

COOPER-BESSEMER



The Welin Maclachlan Winch

SUCCESSFUL operation of the Gravity Davit is almost entirely dependent upon the winch.

After many years of practical experience, the Welin Maclachlan Winch has been developed and it is undoubtedly due to the efficiency of this winch that the Gravity Davit has met with such wholehearted approval by shipowners and shipbuilders thruout the world.

Welin Davit & Boat Corp., 43-64 Vernon Blvd., Long Island City, N. Y.

Welin Quadrant Davits
Norton Davits
Lundin Lifebcats

Welin Maclachlan Gravity Davits
A. B. C. Life Floats
Balsa Box Floats
Standard Lifeboats

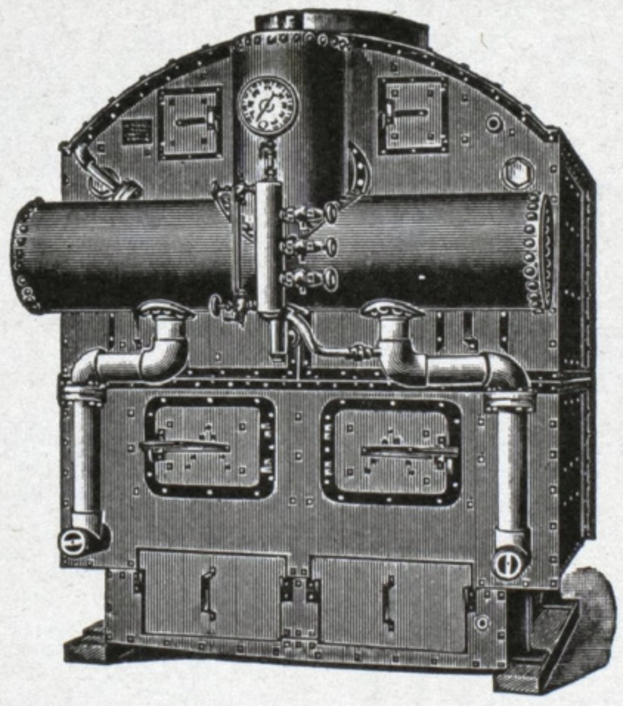
Wooden & Steel Motor Lifeboats
Mills Releasing Gear
Metallic Rafts

LANE LIFEBOATS

WERE SUPPLIED TO THE

BYRD ANTARCTIC EXPEDITION

C. M. Lane Lifeboat Co., Inc.
Brooklyn, N. Y.



CATALOGUE FREE

Almy Water Tube Boiler Co.

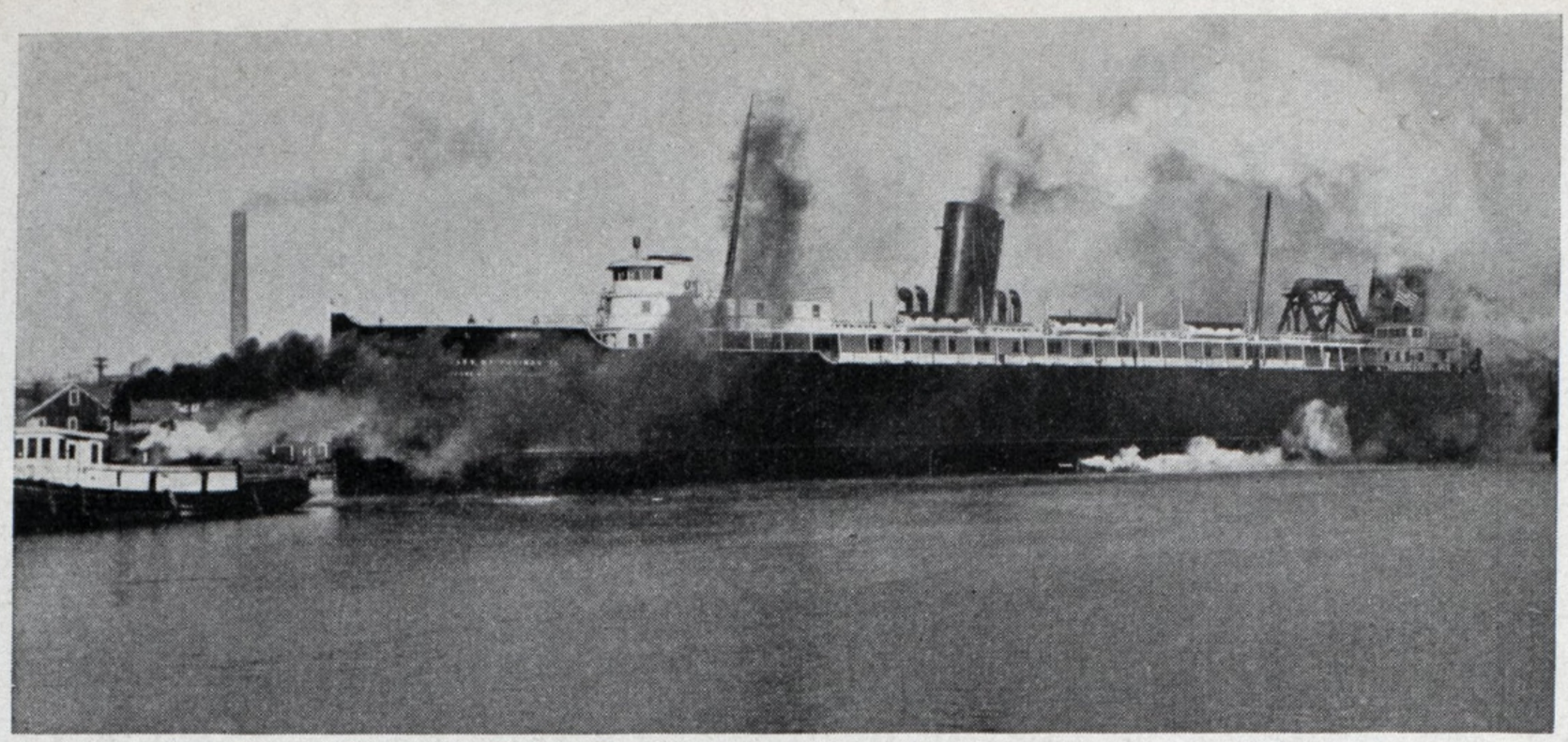
Builders of Sectional Water Tube Boilers for all types of vessels

Providence, R. I. U. S. A.

For Ropeconomy Use

WATERFLEX WHITLOCK CORDAGE

The Utmost in Rope Value



HERE IS THE CITY OF SAGINAW 31, the turbo electric drive carferry built by us for the Pere Marquette Railway Company. When it comes to designing and building vessels our engineering organization, skilled workmen, and modern facilities guarantee satisfaction to the customer.

We design and build steel passenger and freight vessels, carferries, oil tankers, sand suckers, lighters, dredges, yachts, fire boats, tugs, derricks, scows, marine engines and boilers. At this plant you will find excellent facilities, including a 600′ steel floating dry dock, for ship, engine and boiler repairs.

MANITOWOC SHIPBUILDING CORPORATION

MANITOWOC, WISCONSIN

HAMBURG-AMERICAN LINE

PASSENGER SERVICES: New York to Cherbourg, Southampton and Hamburg. New York to Galway, Cobh (Queenstown), Cherbourg and Hamburg. North Pacific Ports to Hamburg, Bremen and Antwerp via Panama Canal.

PLEASURE CRUISES: Around the World, to the West Indies, to Northern Wonderlands.

FREIGHT SERVICES: New York to Hamburg (8 days). Boston, Philadelphia, Baltimore and Norfolk to Bremen and Hamburg.

North Pacific Ports direct to Hamburg, Bremen and Antwerp.

HAMBURG-AMERICAN LINE

39 Broadway New York

Oldman-Magee Boiler Works, Inc.

Boilers, Tanks, Stacks, Structural Work and Castings

Boiler Repairing Promptly Attended to Day or Night

MARINE WORK A SPECIALTY ELECTRIC WELDING

Works: 36-40 Illinois Street - BUFFALO, N. Y.

ANDREW J. MORSE & SON, Inc.

221 High Street BOSTON, MASS.

Established 1837

Diving Apparatus and Submarine Armor
Fire Protection Equipment
The Invincible Nozzle

Catalogues on request

Baltimore City Office
310 E. Lombard St.
Plaza 1935

New York Office
No. 1 Broadway
Digby 2173

The Maryland Dry Dock Company

BALTIMORE, MD.

Drydocking, Shipbuilding and Ship Repairs of All Kinds

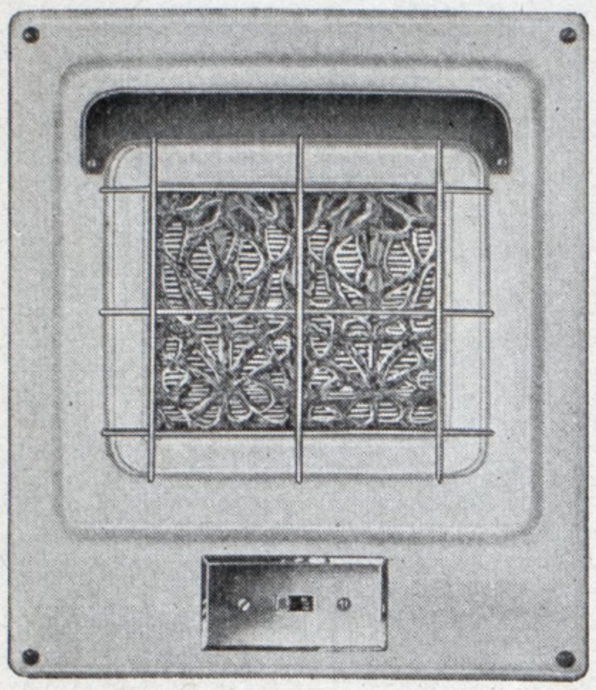
The Most Modern Shops in Baltimore 2—9000 Ton Floating Drydocks

Floating Machine Shop

DAY and NIGHT SERVICE

Plant Phones: Curtis 0500 - 0501 - 0502 - 0503

GIVE YOUR PASSENGERS AS MUCH HEAT AS THEY WANT - - - - - WHEN THEY WANT IT



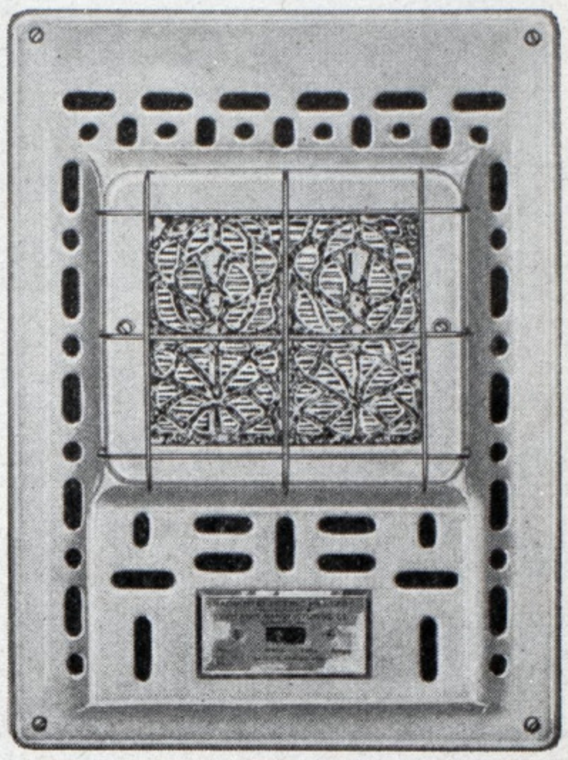
Model 102A — Volts 110 — Rating 1000 Watts
Frame: 14" Wide—16¼" High
Body: 11¾" Wide—11¾" High—4" Deep

Give your passengers a comfortable trip that they'll rave about to their friends. It will be good advertising for your line. The RADIANT ELECTRIC HEATER enables passengers to control the heat in their staterooms to their liking—gives a glow of real hospitality.

Economical to install. Furnished in various color combinations. Costs just a few cents an hour for current.

Write for Full Details — Now!

The
RADIANT ELECTRIC HEATER
Approved by Underwriters.



Model 102B — Volts 110 — Rating 1200 Watts
Frame: 14⅜" Wide—19½" High
Body: 12⅜" Wide—17½" High—4" Deep

SUPERIOR MANUFACTURING COMPANY
Carnegie, Pennsylvania

Star Brass Mfg. Co.

53 Oliver Street -::- Boston, Mass.
MANUFACTURERS OF
Accurate "Non-corrosive" Pressure and Recording Gauges, Revolution Counters, Marine Clocks.

Dead Weight Gage Testers.

Marine, Safety and Relief Valves for all pressures.

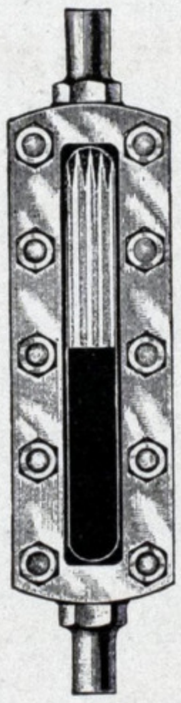
Marine Whistles and Sirens.

Extra Heavy Renewable Globe, Angle and Check Valves.

Star Outside Spring Steam Engine Indicators.

HIGH GRADE THROUGHOUT
SPECIFY AND ORDER THE BEST.

Branches: CHICAGO PITTSBURGH NEW YORK



REFLEX WATER GAGES

Used on all types of boilers by all the Principal Navies of the world

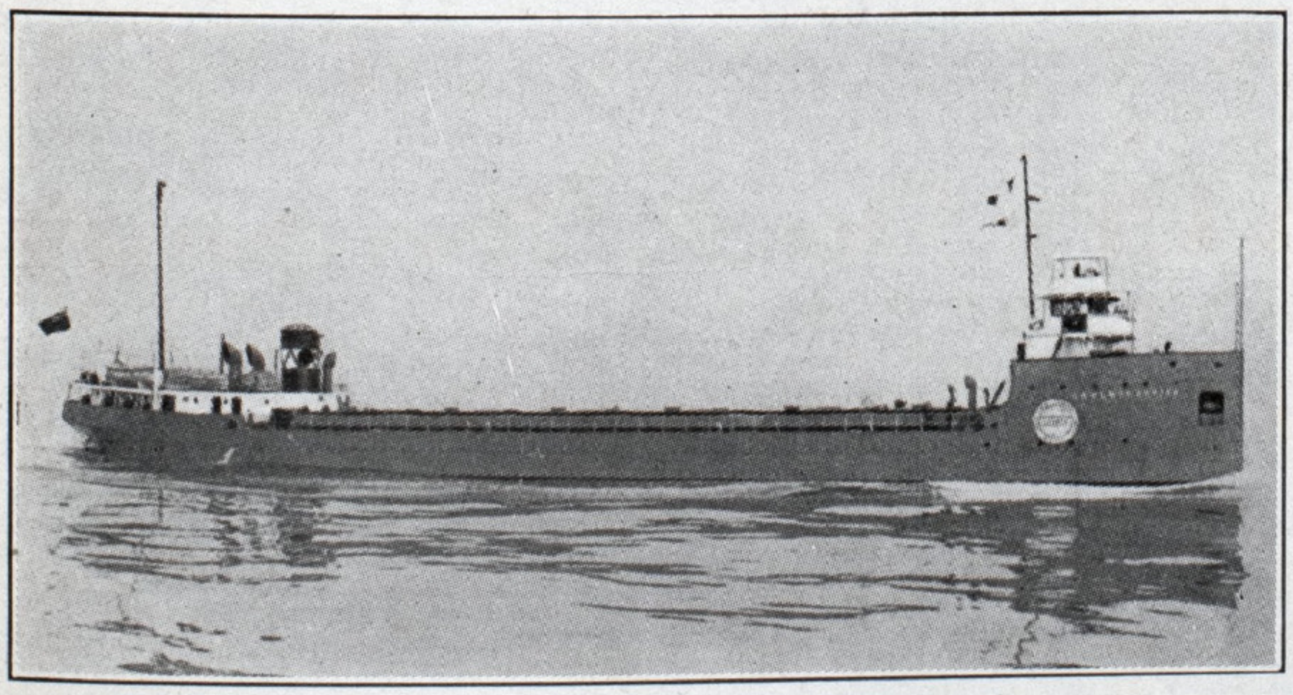
"The Water Shows Black"

ADVANTAGES: Quick and reliable observation of the water level. Safe, sure and durable at high pressure. Not affected by cold air drafts. Most effective protection against injuries to boilers and workmen. Easily applied to all types of gage glass fittings.

When filled with **WATER** the Reflex Gage always appears **BLACK.** When empty it instantly shows **WHITE.** No mistake possible. This feature alone is worth many times the cost of the Reflex.

Send for catalog of Water Gage Apparatus

MANUFACTURED BY THE
JERGUSON GAGE & VALVE CO.
WINTER HILL, SOMERVILLE, MASS.



Motorship
CEMENTKARRIER
Equipped with
Leathem D. Smith Self-unloading System
handling bulk cement
in Gulf of St. Lawrence.

LEATHEM D. SMITH DOCK CO.
20 N. Wacker Drive
Chicago, Ill.
Plant Location
Sturgeon Bay, Wis.

"Where-To-Buy"

A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. ¶Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

ANCHOR CHAINS
National Malleable & Steel Castings Co., 10600 Quincy Ave., Cleveland, O.

ANCHORS
American Engineering Co.. The, Cumberland and Aramingo Sts., Philadelphia, Pa.

AIR COMPRESSORS—See COMPRESSORS

AIR PREHEATERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

ANEROIDS (Engine Room)
Taylor Instrument Co's., 90 Ames St., Rochester, N. Y.

ARMOR (Submarine)
Morse, Andrew J., & Son, Inc., 221 High St., Boston, Mass.

BABBITT METAL
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

BARGES
Dravo Contracting Co., Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.

BARGES (Steel)
American Bridge Co., 71 Broadway, New York City.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.

BAROMETERS
Taylor Instrument Co's., 90 Ames St., Rochester, N. Y.

BATTERIES
Electric Storage Battery Co., The, 19th and Allegheny Sts., Philadelphia.

BEARING (Rubber)
Goodrich, B. F., Rubber Co., Akron, O.

BINNACLES
Ritchie, E. S., & Sons, Brookline, Mass.

BLOWERS (Flue)
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.

BLOWERS (Motor Driven Ventilation)
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

BLOWERS (Turbine Driven)
Westinghouse Elec. & Mfg. Co., S. Philadelphia, Pa.

BOATS (Steel and Wood)
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.

BOILERS
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.

BOILERS (Marine)
Almy Water Tube Boiler Co., 184 Allen St., Providence, R. I.
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Babcock & Wilcox Co., 85 Liberty St., New York City.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Great Lakes Engineering Works, River Rouge, Mich.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Oldman-Magee Boiler Works, Inc., 36-40 Illinois St., Buffalo, N. Y.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.

BOILERS (Water Tube)
Almy Water Tube Boiler Co., 184 Allen St., Providence, R. I.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BOOKS (Technical)
Penton Publishing Co., Cleveland, O.

BRAKES (Electric)
Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

BROKERS (Vessel)
Boland & Cornelius, Marine Trust Bldg., Buffalo, N. Y.
Farley, Edward P., & Co., Inc., 11 Broadway, New York City.

BUNKER FUEL OIL—See FUEL OIL

BURNERS (Oil)—See OIL BURNING EQUIPMENT

CABLES
Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co., 46 South St., New York City.

CALCIUM CARBIDE
Union Carbide Sales Co., 30 E. 42nd St., New York City.

CALKING COTTON
Stratford, Geo., Oakum Co., 120 Montgomery St., Jersey City, N. J.

CAPSTANS
American Engineering Co., The, Cumberland and Aramingo Sts., Philadelphia, Pa.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

CAR FLOATS
American Bridge Co., 71 Broadway, New York City.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.

CASTINGS
Great Lakes Engineering Works, River Rouge, Mich.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Standard Motor Construction Co., 184 Whiton St.. Jersey City, N. J.

CHANDLERY
American Engineering Co., The, Cumberland and Aramingo Sts., Philadelphia, Pa.

COMPASSES
Ritchie, E. S., & Sons, Brookline, Mass.

COMPASSES (Gyro)
Sperry Gyroscope Co., The, Brooklyn, N. Y.

COMPRESSORS
Brunswick-Kroeschell Co., New Brunswick, N. J.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONDENSERS
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Great Lakes Engineering Works, River Rouge, Mich.
Ingersoll-Rand Co., 11 Broadway, New York City.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONTROLLERS (Electric)
Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

CONVEYORS (Portable)
Clark Tructractor Co., Battle Creek, Mich.

CORDAGE
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston, Mass.
Whitlock Cordage Co., 46 South St., New York City.

DAVITS
Welin Davit & Boat Corp., 305 Vernon Ave., Long Island City, N. Y.

DECKING COVERING
Selby, Battersby & Co., 33rd & Arch Sts., Philadelphia.

DEPTH FINDERS
Submarine Signal Co., 160 State St., Boston, Mass.

DIESEL ENGINES—See ENGINES (Diesel)

DIESEL FUEL OIL—See FUEL OIL

DISTILLING APPARATUS
Griscom-Russell Co., 285 Madison Ave., New York City.

DIVING APPARATUS
Morse, Andrew J., & Son, Inc., 221 High St., Boston, Mass.

DRAFT (Artificial and Mechanical for Boilers)
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Great Lakes Engineering Works, River Rouge, Mich.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

DREDGING MACHINERY
Great Lakes Engineering Works, River Rouge, Mich.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

DRINKING FOUNTAINS
Haydenville Co., The, Haydenville, Mass.

DRY DOCKS
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Shipbuilding Corp., Manitowoc, Wis.
Maryland Dry Dock Co., Baltimore, Md.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
New York Shipbuilding Co., Camden, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.

DYNAMOS
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

ECONOMIZERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

EJECTORS (Ash)
Great Lakes Engineering Works, River Rouge, Mich.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

ENGINE SPEED INDICATORS
Sperry Gyroscope Co., The, Brooklyn, N. Y.

ENGINEERS (Marine, Mechanical and Consulting)
Crandall Engineering Co., The, 134 Main St., Cambridge, Mass.
Great Lakes Engineering Works, River Rouge, Mich.
Todd Shipyards Corp., 25 Broadway, New York City.
United Dry Docks, Inc., 11 Broadway, New York City.

ENGINEERS (Shipbuilding)
Shipbuilding Efficiency Engineering Bureau, P. O. Box 1613, Pittsburgh, Pa.

ENGINES
Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
Fairbanks, Morse & Co., 900 S. Wabasn Ave., Chicago.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Standard Motor Construction Co., 184 Whiton St., Jersey City, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.

ENGINES (Diesel)
Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago.
McIntosh & Seymour Corp., Auburn, N. Y.
Standard Motor Construction Co., 184 Whiton St., Jersey City, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Winton Engine Co., 2116 W. 106th St., Cleveland, O.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Internal Combustion)
Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago.
Standard Motor Construction Co., 184 Whiton St., Jersey City, N. J.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Marine)
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago.
McIntosh & Seymour Corp., Auburn, N. Y.

Statement of the ownership, management, circulation, etc., required by the act of congress of Aug. 24, 1912, of MARINE REVIEW published monthly at Cleveland, Ohio, for April, 1931, State of Ohio, county of Cuyahoga, ss. Before me, a notary public in and for the state and county aforesaid, personally appeared J. D. Pease, who, having been duly sworn according to law deposes and says that he is the Business Manager of MARINE REVIEW and that the following is to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of Aug. 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit: 1.—That the names and addresses of the publisher, editor, managing editor and business managers are: Publisher, The Penton Publishing Co., Cleveland, O. Editor, A. H. Jansson, Cleveland, O.; Business Manager, J. D. Pease, Cleveland .O. 2.—That the owners are: Names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock: The Penton Publishing Co., Cleveland, O.; John A. Penton, Cleveland, O.; C. J. Stark, Cleveland, O.; J. D. Pease, Cleveland, O.; F. V. Cole, Cleveland, O.; J. R. Dawley, Cleveland, O. 3.—That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None. 4.—That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. J. D. Pease. Sworn to and subscribed before me this 20th day of March, 1931. (Seal) H. L. Richey. (My commission expires May 7, 1933).

*

ENGINES (Marine) Cont.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
New York Shipbuilding Co., Camden, N. J.
Sturtevant, B. F., Co., Inc., Hyde Park, Boston, Mass.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.
United Dry Docks Inc., 11 Broadway, New York City.
Winton Engine Co., 2116 W. 106th St., Cleveland, O.

ENGINES (Oil)
Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Standard Motor Construction Co., 184 Whiton St., Jersey City, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Steam, Steering)
Dake Engine Co., Grand Haven, Mich.

ENGINES (Vertical, Enclosed, Self Oiling)
Troy Engine & Machine Co., Troy, Pa.

EUROPEAN STEAMSHIP LINES (Passenger and Freight)
Hamburg-American Line, 39 Broadway, New York City.

EVAPORATORS
Griscom-Russell Co., 285 Madison Ave., New York City.

FANS
Diehl Mfg. Co., Elizabethport, N. J.

FANS (Electric)
General Electric Co., Schenectady, N. Y.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

FAUCETS
Haydenville Co., The, Haydenville, Mass.

FEED WATER HEATERS—See HEATERS AND PURIFIERS (Feed Water)

FEED WATER REGULATORS
Babcock & Wilcox Co., 85 Liberty St., New York City.

FIRE BRICK
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

FLOORING
Greenheart Lumber Co., The, 70 Wall St., New York City.
Selby, Battersby & Co., 33rd & Arch Sts., Philadelphia.

FLOORING-STEEL (Ventilating, Non-Slipping, Fireproof)
Dravo-Doyle Co., Dravo Bldg., 302 Penn Ave., Pittsburgh, Pa.

FLOOR PLATES
Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.

FOUNDERS
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
New York Shipbuilding Co., Camden, N. J.

FREIGHT SERVICE
Hamburg-American Line, 39 Broadway, New York City.

FUEL OIL
Vacuum Oil Co., 61 Broadway, New York City.

GAGES (Water)
Jerguson Gage & Valve Co., Somerville, Mass.

GALLEY RANGES
Stamford Foundry Co., Stamford, Conn.

GAUGES (Pressure, Vacuum)
Taylor Instrument Co's., 90 Ames St., Rochester, N. Y.

GEARS (Marine Equipment)
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., So. Philadelphia. Pa.

GENERATING SETS
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Troy Engine & Machine Co., Troy, Pa.

GENERATING SETS (Direct Connected)
General Electric Co., Schenectady, N. Y.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

GENERATORS
Diehl Mfg. Co., Elizabethport, N. J.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

GRATINGS (Steel)
Dravo-Doyle Co., Dravo Bldg., 302 Penn Ave., Pittsburgh, Pa.

GRATINGS & TREADS
Dravo-Doyle Co., Dravo Bldg., 302 Penn Ave., Pittsburgh, Pa.

GREASE
Vacuum Oil Co., 61 Broadway, New York City.

GREASE (Launching)
Vacuum Oil Co., 61 Broadway, New York City.

GYPSEYS
American Engineering Co, The, Cumberland and Aramingo Sts., Philadelphia, Pa.

GYRO-PILOT (Automatic Steering)
Sperry Gyroscope Co., The, Brooklyn, N. Y.

HAWSERS (Manila)
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co., 46 South St., New York City.

HEATERS (Electric)
Superior Mfg. Co., The, Gregg St., Carnegie, Pa.

HEATERS AND PURIFIERS (Feed Water)
Davis Engineering Co., 90 West St., New York City.
Griscom-Russell Co., 285 Madison Ave., New York City.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

HEATING EQUIPMENT
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

HEATING STOVES
Stamford Foundry Co., Stamford, Conn.

HOISTING ENGINES
Hyde Windlass Co., Bath, Me.

HOISTS (Air)
American Shipbuilding Co., Foot of W. 54th St., Cleveland.

HOISTS (Electric, Pneumatic, Hand)
American Engineering Co., The, Cumberland and Aramingo Sts., Philadelphia, Pa.

ICE MACHINES—See REFRIGERATING MACHINERY

INDICATORS (Direction & Revolution)
Sperry Gyroscope Co., The, Brooklyn, N. Y.

INDICATORS (Helm Angle)
Sperry Gyroscope Co., The, Brooklyn, N. Y.

INDICATORS (Speed)
Sperry Gyroscope Co., The, Brooklyn, N. Y.

INSURANCE (Marine)
Boland & Cornelius, Marine Trust Bldg., Buffalo, N. Y.

LAMPS (Mazda and Arc)
General Electric Co., Schenectady, N. Y.

LIFEBOATS
Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn, N. Y.
Welin Davit & Boat Corp., 305 Vernon Ave., Long Island City, N. Y.

LIFESAVING EQUIPMENT
Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn, N. Y.

LIGHTING EQUIPMENT
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

LUBRICATING OIL
Vacuum Oil Co., 61 Broadway, New York City.

LUMBER
Greenheart Lumber Co., The, 70 Wall St., New York City.

MACHINERY (Marine)
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Ship Building Corp., Manitowoc, Wis.
Maryland Dry Dock Co., Baltimore, Md.

MACHINES (Sounding)
Submarine Signal Co., 160 State St., Boston, Mass.

MACHINISTS
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
New York Shipbuilding Co., Camden, N. J.

MAGNETS (Lifting)
Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

MANILA OAKUM—See OAKUM (Marine, Rope, Packings, Plumbers)

MARINE RAILWAY BUILDERS
Crandall Engineering Co., The, 134 Main St., Cambridge, Mass.

MATERIAL HANDLING EQUIPMENT
Smith, Leatham D., Dock Co., Sturgeon Bay, Wis.

METERS (Gas & Air)
Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

METERS (Water & Oil)
Worthington Pump & Machinery Corp., Harrison, N. J.

MOTOR GENERATOR SETS
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

MOTORS
Diehl Mfg. Co., Elizabethport, N. J.

MOTORS (Electric)
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

NAUTICAL INSTRUMENTS
Ritchie. E. S., & Sons, Brookline, Mass.
Sperry Gyroscope Co., The, Brooklyn, N. Y.

NAVIGATING INSTRUMENTS
White, Kelvin & Wilfrid O., Co., 112 State St., Boston, Mass.

OAKUM (Marine, Rope, Packing, Plumbago)
Stratford, Geo., Oakum Co., 120 Montgomery St., Jersey City, N. J.

OIL BURNING EQUIPMENT
Babcock & Wilcox Co., 85 Liberty St., New York City.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Coen Co., Inc., 610 S. Broadway, Los Angeles, Cal.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

OIL CLARIFIERS
Sharples Specialty Co., Westmoreland, Philadelphia, Pa.

OIL PURIFIERS
Sharples Specialty Co., Westmoreland, Philadelphia, Pa.

OIL FOR ALL PURPOSES (Marine)
Vacuum Oil Co., 61 Broadway, New York City.

PASSENGER SERVICE
Hamburg-American Line, 39 Broadway, New York City.

PILING
Greenheart Lumber Co., The, 70 Wall St., New York City.

POWDERED COAL BURNERS
Coen Co., Inc., 610 S. Broadway, Los Angeles, Cal.

PROPELLER BLADES AND HUBS
Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLER WHEELS
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Great Lakes Engineering Works, River Rouge, Mich.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLERS
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.

PULVERIZED COAL BURNERS
Todd Shipyards Corp., 25 Broadway, New York City.

PULVERIZED COAL SYSTEMS
Todd Shipyards Corp., 25 Broadway, New York City.

PUMPS
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Great Lakes Engineering Works, River Rouge, Mich.
Warren Steam Pump Co., Warren, Mass.

PUMPS (Ballast)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Warren Steam Pump Co., Warren, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Bilge)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Warren Steam Pump Co., Warren, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Boiler Feed)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Warren Steam Pump Co., Warren, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Centrifugal)
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Direct Acting)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

PUMPS (Fuel Oil)
Coen Co., Inc., 610 S. Broadway, Los Angeles, Cal.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Power)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Steam)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Warren Steam Pump Co., Warren, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Vacuum)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.

PURIFICATION SYSTEMS—See WATER PURIFICATION SYSTEMS

PURIFIERS (Oil)
Sharples Specialty Co., Westmoreland, Philadelphia, Pa.

PYROMETERS (Diesel Engine)
Taylor Instrument Co's., 90 Ames St., Rochester, N. Y.

RAFTS
Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn, N. Y.

RAILWAY DRY DOCKS
Crandall Engineering Co., The, 134 Main St., Cambridge, Mass.

RANGES
Stamford Foundry Co., Stamford, Conn.

REFRIGERATING MACHINERY
Brunswick-Kroeschell Co., New Brunswick, N. J.

REFRIGERATORS
Frigidaire Corp., Dayton, Ohio.

REPAIRS
Maryland Dry Dock Co., Baltimore, Md.

REPAIRS (Electric)
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

REPAIRS (Marine)
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Charleston Dry Dock & Machine Co., Charleston, S. C.
Chicago Shipbuilding Co., So. Chicago, Ill.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Ship Building Corp., Manitowoc, Wis.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
New York Shipbuilding Co., Camden, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.
United Dry Docks, Inc., 11 Broadway, New York City.

REPAIRS (Turbine)
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

REVOLUTION COUNTERS
Sperry Gyroscope Co., Brooklyn, N. Y.

RIVET SETS
Wilcox-Rich Corp., 9771 French Rd., Detroit, Mich.

ROPE (Manila, Net, Sisal, and Other Hard Fiber Cordage)
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co., 46 South St., New York City.

ROPE (Transmission)
Columbian Rope Co., Auburn, N. Y.

ROPE OAKUM
Stratford, Geo., Oakum Co., 120 Montgomery St., Jersey City, N. J.

RUBBER TILE
Selby, Battersby & Co., 33rd & Arch Sts., Philadelphia.

RUST PREVENTATIVE (Oil)
Vacuum Oil Co., 61 Broadway, New York City.

SAFETY VALVES (Marine)
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

SCHOONERS (Auxiliary)
American Shipbuilding Co., Foot of W. 54th St., Cleveland.

SEARCHLIGHTS (High Intensity)
Sperry Gyroscope Co., The, Brooklyn, N. Y.

SEARCHLIGHTS (Incandescent and Arc)
General Electric Co., Schenectady, N. Y.
Sperry Gyroscope Co., The, Brooklyn, N. Y.

SELF UNLOADING EQUIPMENT
Smith, Leatham D., Dock Co., Sturgeon Bay, Wis.

SEPARATORS (Oil)
Babcock & Wilcox Co., 85 Liberty St., New York City.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Sharples Specialty Co., Westmoreland, Philadelphia, Pa.

SHIPBUILDERS
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Charleston Dry Dock & Machine Co., Charleston, S. C.
Dravo Contracting Co., Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Ship Building Corp., Manitowoc, Wis.
Maryland Dry Dock Co., Baltimore, Md.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
New York Shipbuilding Co., Camden, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.
United Dry Docks, Inc., 11 Broadway, New York City.

SHIPBUILDING
Smith, Leatham D., Dock Co., Sturgeon Bay, Wis.

SHIPBUILDING SYSTEMS
Isherwood, J. W., & Co., Ltd., 17 Battery Place, New York City.

SHIP REPAIRS
Dravo Contracting Co., Neville Island, Pittsburgh, Pa.

SHIP STABILIZERS
Sperry Gyroscope Co., The, Brooklyn, N. Y.

SIGNALS (Submarine)
Submarine Signal Co., 160 State St., Boston, Mass.

SOUNDING MACHINES
Submarine Signal Co., 160 State St., Boston, Mass.

SPUN OAKUM
Stratford, Geo., Oakum Co., 120 Montgomery St., Jersey City, N. J.

STEAMSHIP LINES (Passenger and Freight)
Hamburg-American Lines, 39 Broadway, New York City.

STEAM GAGES
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

STEAM TRAPS
Davis Engineering Co., 90 West St., New York City.

STEEL BARGES—See BARGES (Steel)

STEEL TANKS
Brunswick-Kroeschell Co., New Brunswick, N. J.

STEERING ENGINES
Hyde Windlass Co., Bath, Me.

STEERING GEARS
American Engineering Co., The, Cumberland and Aramingo Sts., Philadelphia, Pa.
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.

STOKERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

STORAGE BATTERIES—See BATTERIES

STOVES
Stamford Foundry Co., Stamford, Conn.

STRAINERS (Oil)
Coen Co., Inc., 610 S. Broadway, Los Angeles, Cal.

SUPERHEATERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

SWITCHBOARDS
General Electric Co., Schenectady, N. Y.
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

TELEMOTORS
Hyde Windlass Co., Bath, Me.

TELEMOTORS (Hydraulic & Electric)
American Engineering Co., The, Cumberland and Aramingo Sts., Philadelphia, Pa.

TERMINAL EQUIPMENT
Dravo Contracting Co., Neville Island, Pittsburgh, Pa.

THERMOMETERS (Temperature, Recording)
Taylor Instrument Co's., 90 Ames St., Rochester, N. Y.

TOWBOATS
Dravo Contracting Co., Neville Island, Pittsburgh, Pa.

TOWING & MOORING ENGINES
American Engineering Co., The, Cumberland and Aramingo Sts., Philadelphia, Pa.

TOWING LINES
Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co., 46 South St., New York City.

TRACTORS
Clark Tructractor Co., Battle Creek, Mich.
Elwell-Parker Electric Co., The, 4205 St. Clair Ave., Cleveland, O.

TRANSMISSION (Rope)—See ROPE (Transmission)

TREADS (Safety)
Dravo-Doyle Co., Dravo Bldg., 302 Penn Ave., Pittsburgh, Pa.

TRUCKS
Clark Tructractor Co., Battle Creek, Mich.
Elwell-Parker Electric Co., The, 4205 St. Clair Ave., Cleveland, O.

TRUCKS (Dump)
Clark Tructractor Co., Battle Creek, Mich.

TURBINES (Electric)
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

TURBINES (Marine)
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

TURBINES (Steam)
DeLaval Steam Turbine Co., Trenton, N. J.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

TWINE AND ROPE
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co., 46 South St., New York City.

VENTILATING EQUIPMENT
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

VENTILATORS
Allen Corp., 1040 14th St., Detroit, Mich.

WATER COOLERS
Frigidaire Corp., Dayton, Ohio.

WATER PURIFICATION SYSTEMS
Griscom-Russell Co., 285 Madison Ave., New York City.

WELDERS (Electric Arc)
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

WHISTLES
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

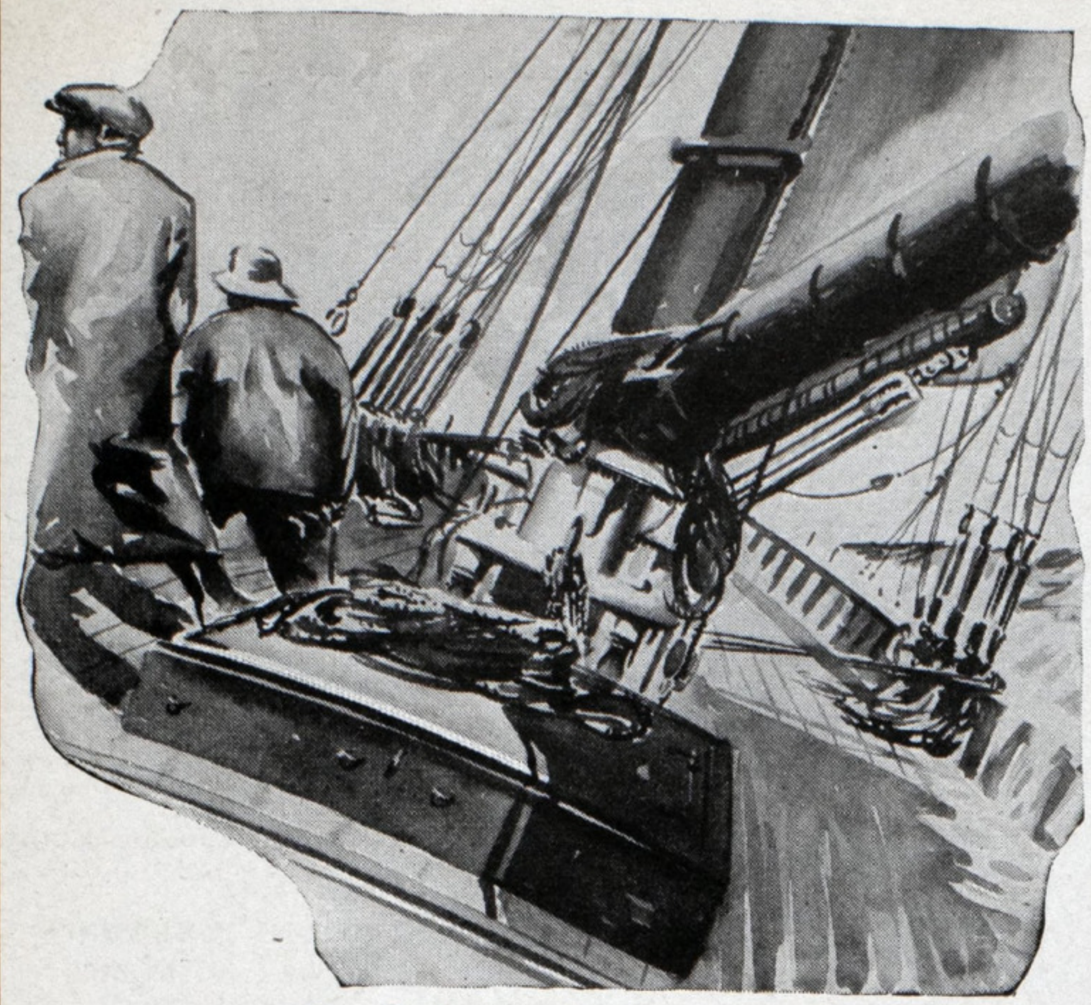
WINCHES
American Engineering Co., The, Cumberland and Aramingo Sts., Philadelphia, Pa.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINDLASSES
American Engineering Co., The, Cumberland and Aramingo Sts., Philadelphia, Pa.
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINDOWS (Balanced Frameless)
Kearfoot Engineering Co., 117 Liberty St., New York City.

WORKBOATS
Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above



"Then Ho for the sea so damp and free"

Deep sea sailormen realize that in a well-caulked tight bottom lies not only the welfare of the vessel and the crew but the safe delivery of the cargo.

For a hundred years,

STRATFORD OAKUM

has been keeping the ocean out of the finest ships that sail. Sailors depend on Stratford Oakum because they know it is the best.

Stratford Oakum is most economical to use. Wastage is very small, less labor is required to spin and caulk and it "stays put," whether in deck, side or bottom.

Seams right-caulked with Stratford Oakum will stay tight longer than when any other material is used.

Be sure you get Stratford Oakum

George Stratford Oakum Company
Jersey City, New Jersey
Also Manufacturers of Cotton Wiping Waste

*5

SAMSON SPOT
Log Lines

Trade Mark Reg. U.S. Pat. Off.

Smooth, tough and durable; no adulterating material to stiffen it and decrease strength and durability. Solid braided of extra quality cotton yarn. Uniform in size and quality. Easily identified by the colored spots, our trade mark.

We also manufacture flag halyards, lead lines, tiller rope; solid braided cotton cord in all sizes for various marine uses. Ask for catalog and samples.

SAMSON CORDAGE WORKS
89 Broad Street — Boston, Mass.

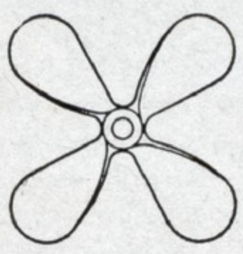
Ship For Sale?

If you have a passenger ship, freighter, tanker, tug or any other floating property or marine equipment for sale advertise it in Marine Review.

The rate is $3.00 for a minimum advertisement of 30 words. Additional words, 10c each.

*

SIMPLEX



PITCHOMETER

A light weight, accurate and practical instrument for measuring the pitch and setting of propeller blades. Price $18.50 express paid. Return in 10 days if not entirely satisfied and the price will be refunded. Full instructions for using.

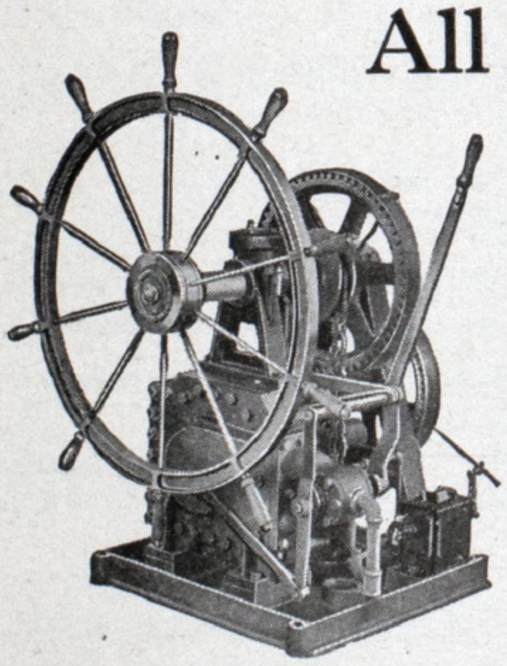
BALE ENGINEERING CO.
383 Oak Street — Portland, Ore.

GRISCOM-RUSSELL

Evaporators—Feed Water Heaters—Extraction Steam Heaters—Generator Air Coolers—Lubricating Oil Coolers—Steam, Air and Oil Separators—Filters—Strainers—Expansion Joints
Described in bulletins which will be sent on request

THE GRISCOM-RUSSELL COMPANY 285 Madison Avenue, NEW YORK
CHICAGO: 20 North Wacker Drive

All Over the Lakes They're Using Dake's

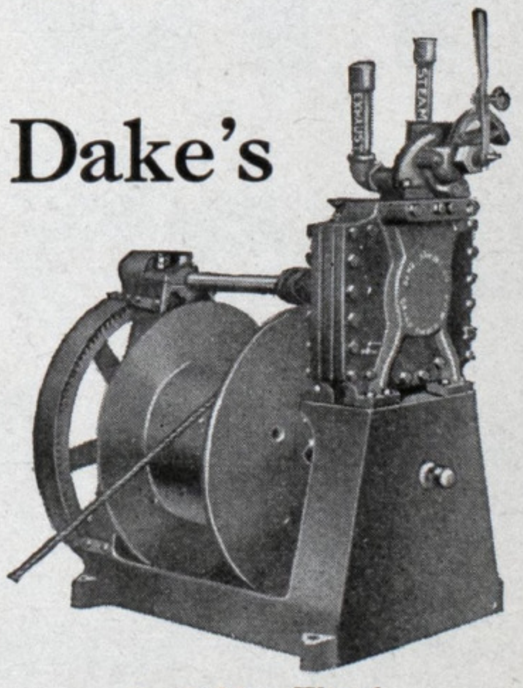


"CS" Steering Gear

Go into any port of consequence on the Great Lakes and you will find vessels using DAKE Steering Gears, Capstans, Windlasses or other auxiliaries. Ask the owners and you will find they give efficient dependable service, with the least expense for upkeep. DAKE Auxiliaries are all simple of construction and very compact. They require less space and very little attention. Write for information on any auxiliaries you are interested in.

Steering Gears, Capstans (hand and steam) Anchor Windlasses, Stage Hoists, Snub Line Winches, Spud Lifters, Net Lifters and Marine Castings.

Dake Engine Co., GRAND HAVEN, MICHIGAN



Snub Line Winch

*

Classified Advertisements

For Sale and Miscellaneous—Help and Positions Wanted

For Sale and Miscellaneous Advertisements
10c per word—minimum advertisements—$3.00

Six words must be added for box address.

To insure insertion, advertisements must reach us by the 10th of the month preceding date of issue.

Help Wanted Advertisements
6c per word—minimum advertisement—$3.00

Position Wanted Advertisements
4c per word—minimum advertisement—$1.00

Please have remittance accompany order.

Bids Wanted

U. S. ENGINEER OFFICE, P. O. BOX 667, Vicksburg, Mississippi.—Sealed bids will be received at this office until 10 o'clock a. m., April 28, 1931, and then opened, for constructing and delivering afloat at Vicksburg, Mississippi, one 16 inch self-propelled pipe line dredge complete.

Position Wanted

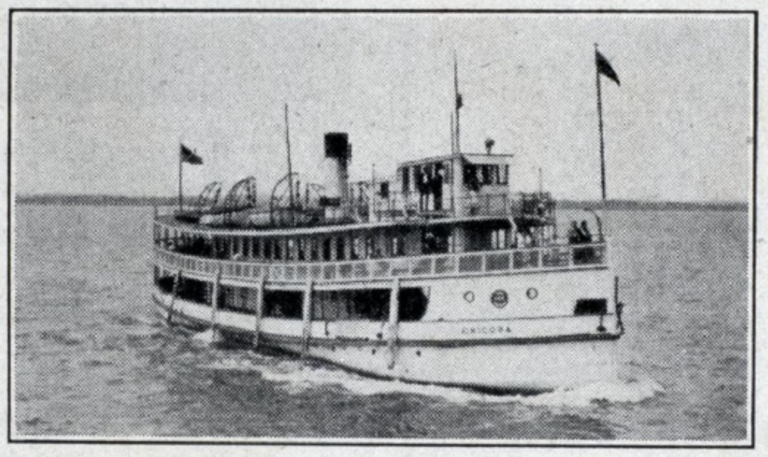
AT LIBERTY FOR COMING SEASON. First class steward, all around cook. On the Great Lakes since 1905. Go anywhere. Wife and waitress. Bill DePuy, Elk's Club, Tulsa, Okla.

POSITION WANTED AS ENGINEER (DIESEL) ferry yacht or tug. Ten years experience. Will go anywhere. Best of references. Write or wire H. C. Stringer, Hathorn, Miss.

ELECTRICAL ENGINEER ASSISTANT, OPEN for immediate position. 20 years experience in planning, construction and supervision of switch boards, ships fixtures and layout of wiring for both Salt and Fresh water vessels. Address Box No. 422, MARINE REVIEW, Cleveland, Ohio.

For Sale

FOR SALE. MOTOR FREIGHT BOAT "WHITE Swan" built by Burger in 1922. 81 x 23 x 7½, three inch oak hull. Carries 180 tons on 8½ foot draught. 4 cy. 100 H. P. Kahlenburg oil engines, speed 8 miles, fuel and oil consumption about $1.00 an hour. Fully equipped, gasoline deck engine, electric lights, two anchors, 360 feet chains. Cost new $30,000.00. Write for price. Oriental Mills Transit Co., Manitowoc, Wis.



ON ACCOUNT OF DISCONTINUING AMUSEment Park for subdivision will sell two steel Passenger Steamers—S.S. Bedell, length 104 feet, breadth 28 feet, draft 8 feet, 700 passengers. S.S. Chicora, length 124 feet, breadth 33 feet, draft 8 feet, 1000 passengers. Both in first class condition. Details on application—Erie Beach Park, Ltd., 402 Walbridge Building, Buffalo. N. Y.

For Sale

FOR SALE
WOODEN TOW BARGE PESHTIGO
201′ Keel 37′ Beam 12′ Depth.
O. W. Blodgett, Bay City, Mich.

FOR SALE—2 SCOWS 26 FT. BY 135 FT. H. Riley, Foot West Genesee St., Buffalo, N. Y.

FOR SALE
WOODEN TOW BARGE N. C. HOLLAND
187′ Keel 32′ Beam 11′ 2″ Depth.
O. W. Blodgett, Bay City, Mich.

FOR SALE—LUMBER STEAMER CHRISTIE, length 160 feet, capacity 800 tons, write Herman H. Hettler Lbr. Co., 2601 Elston Ave., Chicago, for complete description, etc.

Wanted

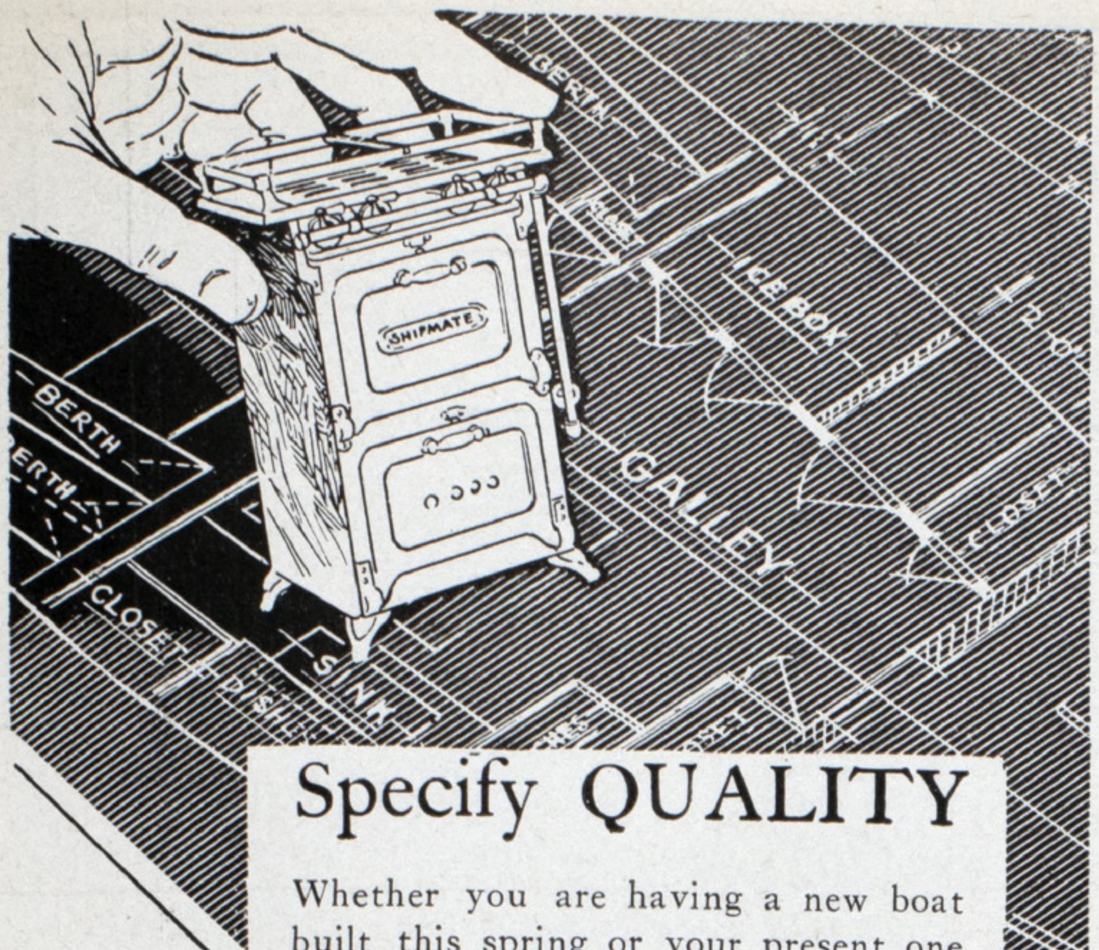
WANTED: STEEL TUG, APPROXIMATEly 100 ft. long, 24 ft. beam, 750 H. P. Address box 421, MARINE REVIEW, Cleveland, Ohio.

TO OUR SUBSCRIBERS

The classified section of MARINE REVIEW is for your convenience—its value is proving worthwhile to everyone who uses it to buy and sell.

If you want to buy or sell ships or marine equipment—need a man for your organization—make it known to the entire marine industry through the use of classified advertising in MARINE REVIEW.

Mail copy for your advertisement in the May issue today, so it reaches us before April 20.



Specify QUALITY

Whether you are having a new boat built this spring or your present one reconditioned, your architect wants you to be satisfied not only with the job as a whole but with every piece of equipment that goes into it.

For the galley range the specification should read "SHIPMATE".

THE STAMFORD FOUNDRY CO.
STAMFORD, CONN.

SHIPMATE

Propeller Wheels and Blades

to fit any hub.

Sheriffs Manufacturing Co.
Established 1854
Milwaukee. Wis.

Vessel and Insurance Agents

John J. Boland — Adam E. Cornelius

BOLAND & CORNELIUS

VESSEL OWNERS AND BROKERS
Marine Insurance Agents
Marine Trust Building BUFFALO, N. Y.

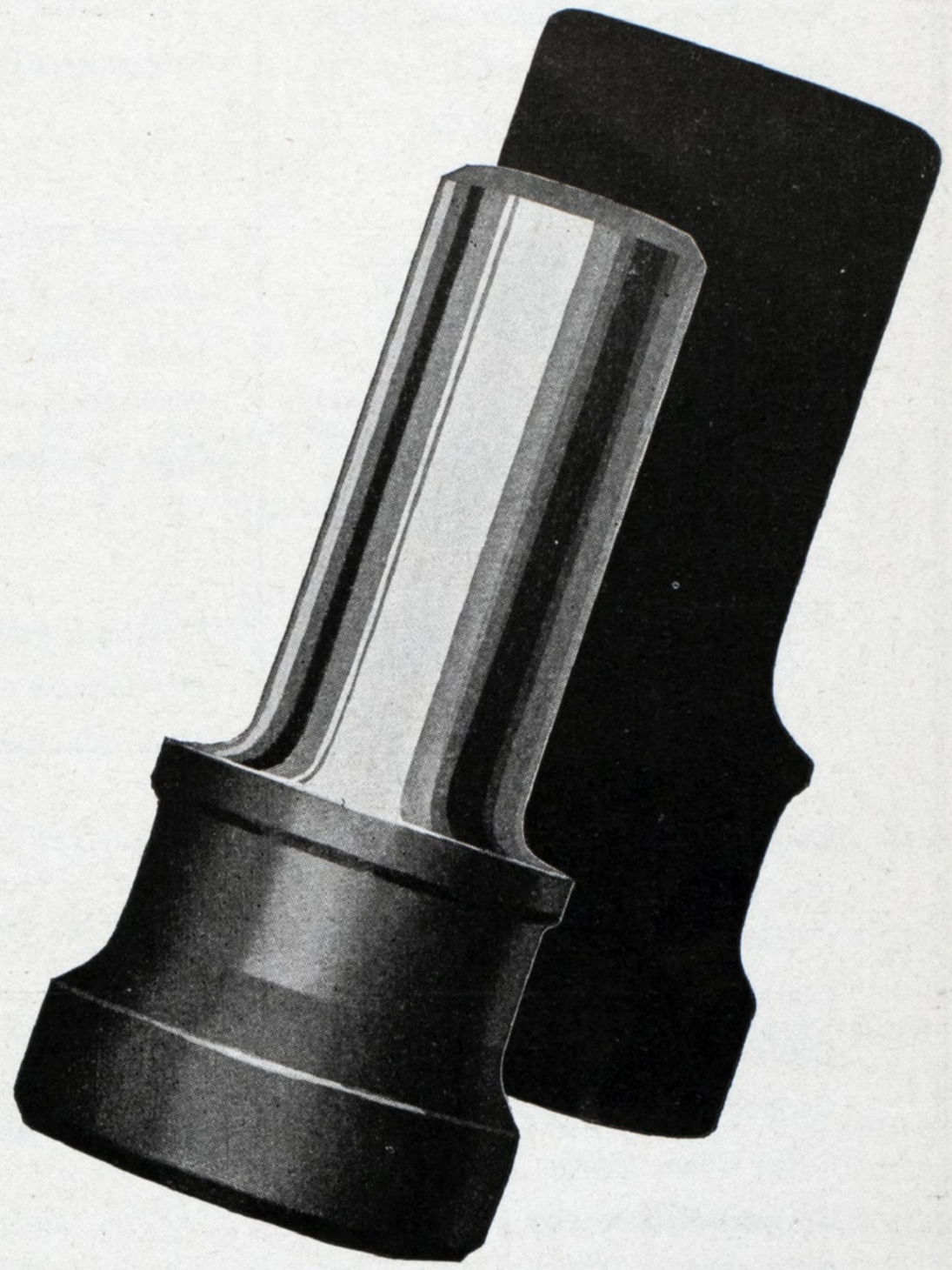
Edward P. Farley & Co.

Incorporated

Steamship Owners, Agents and Brokers

11 Broadway—New York

Drive More Rivets at Lower Cost

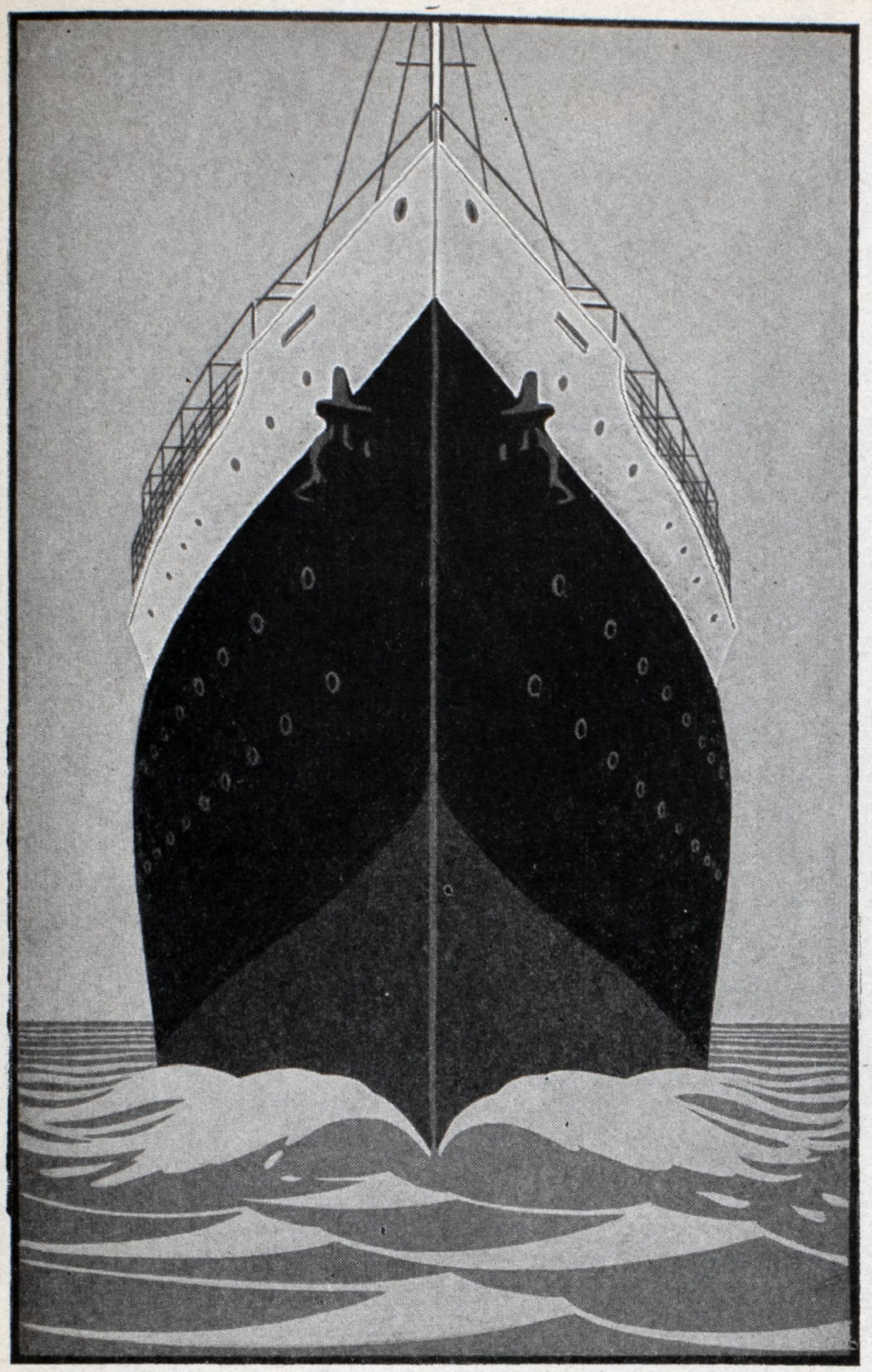


Rich Red Head Rivet Sets can be recupped *cold*. Just turn out the burr in a lathe. Many users find they can be recupped fifteen times or more. Send for a sample, mentioning the size and shank you want. Then test a Rich Red Head against any other rivet sets you are now using.

RICH Red Head Rivet Sets

Manufactured by
WILCOX-RICH CORP.
9771 French Road, Detroit

Index To Advertisers



THE ELECTRIC SHIP COMES IN

Electricity, the great industrial modernizer, has now put to sea and has brought to ocean travel all the advantages of high speed, great economy, and reliable operation. • Progressive lines are awakening to the fact that electric propulsion is a highly salable asset—that the new demand for greater comfort at sea is setting old standards aside—that the public is now seeking, in addition to transportation, that highway smoothness and vibrationless speed that can be enjoyed with electric drive. • General Electric marine engineers have long cöoperated in furnishing turbine-electric propulsion. Their practical experience is at your service whether your needs call for turbine-gear, turbine-electric, or Diesel-electric drive, or electric equipment for ships' auxiliaries. • These engineers will be glad to show you the economic advantages that invariably follow in the wake of a change to modern, progressive types of propulsion.

JOIN US IN THE GENERAL ELECTRIC PROGRAM, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

173-9

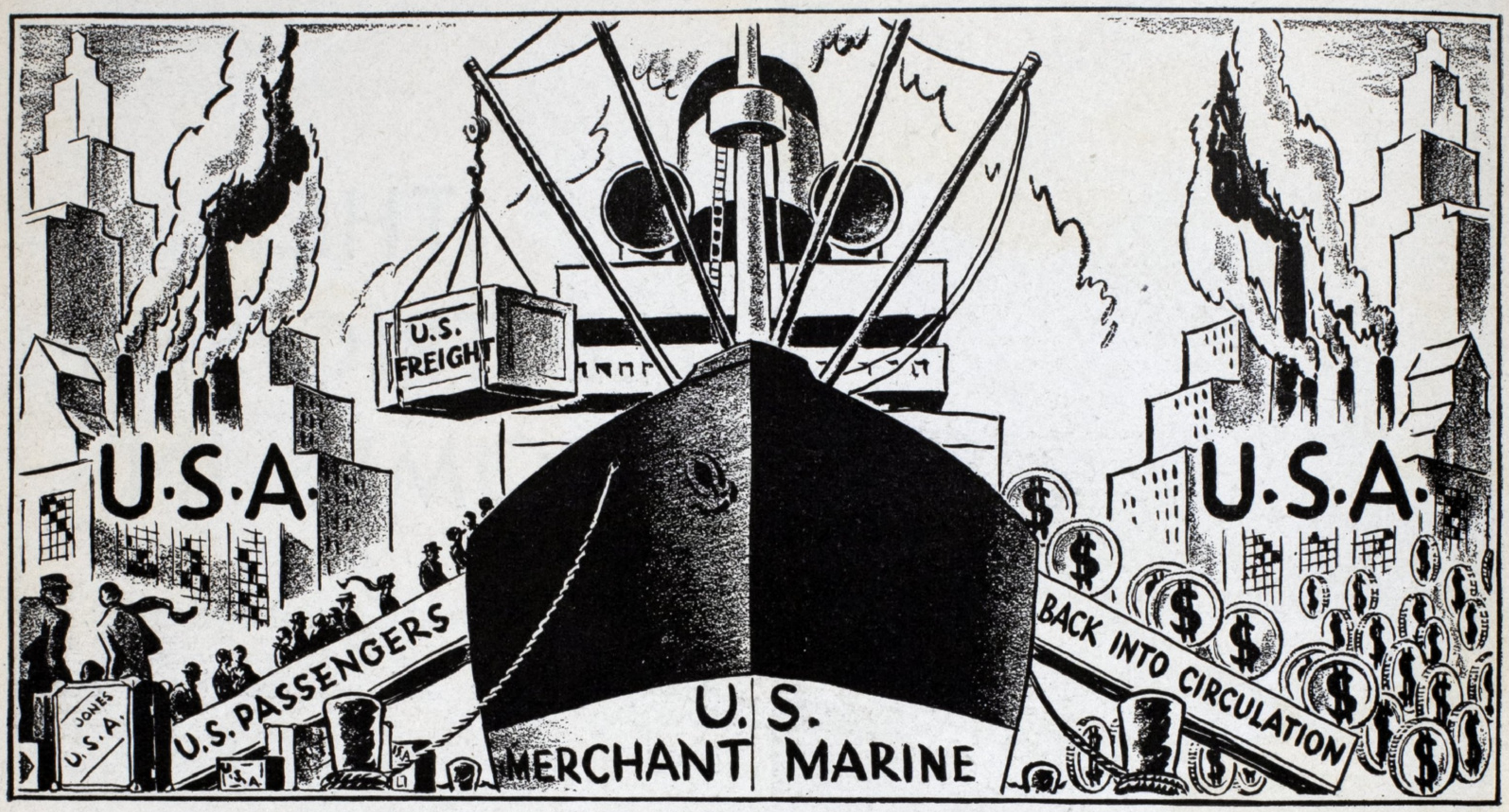
GENERAL ELECTRIC

MARINE EQUIPMENT

Ship and Travel on American Vessels

By patronizing an American shipping line you spend your money at home

IT IS GOOD BUSINESS . . . IT IS PATRIOTIC



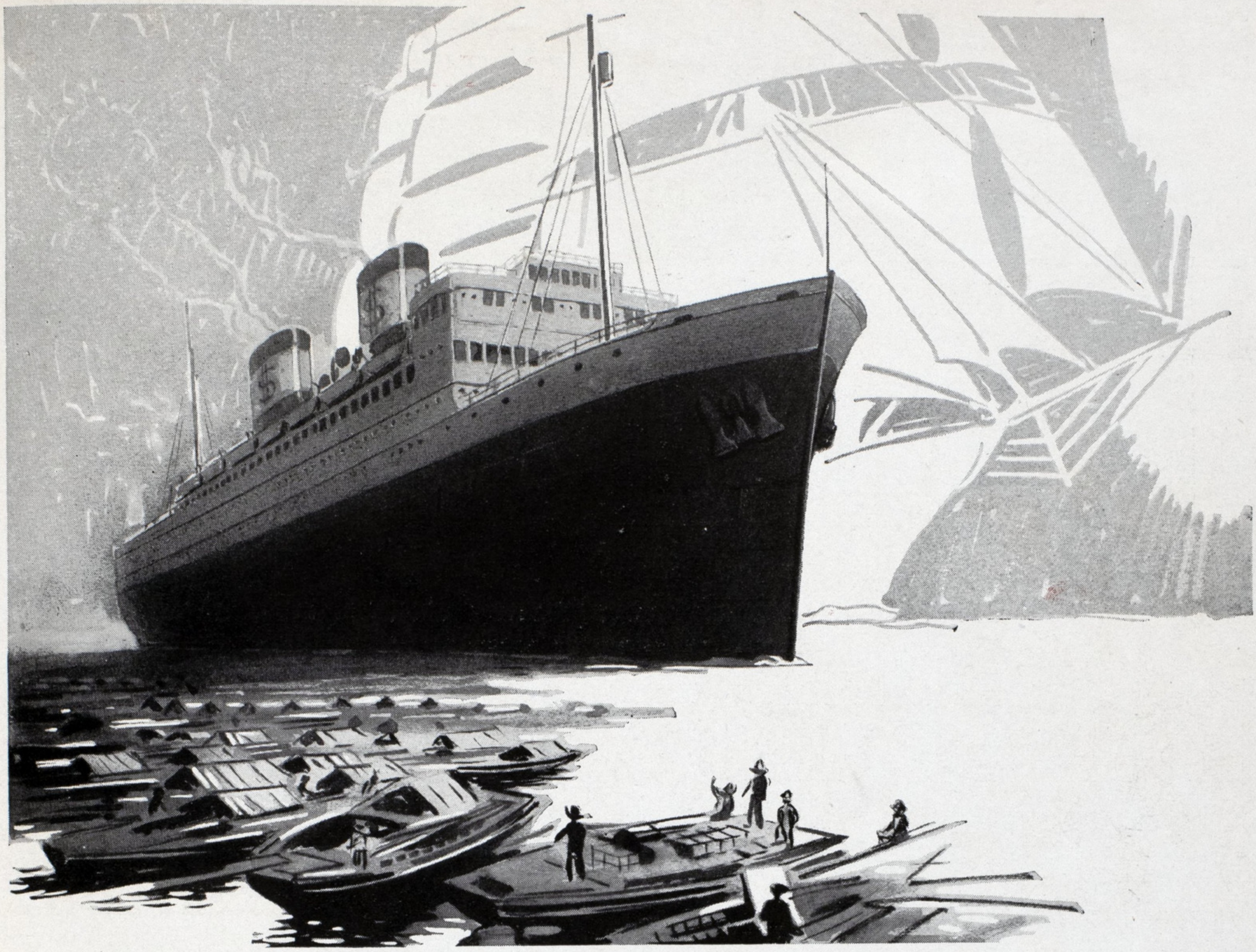
AMERICAN ships are fueled in the United States. They are provisioned in the United States. The crews that operate them are, in the greater part, paid in the United States. The executive staffs of the shipping companies are maintained in the United States. Taxes are paid here, dividends are distributed here.

Over 83 percent of your freight bill or passage money when paid to an American shipping line is spent in the United States.

NEW YORK SHIPBUILDING COMPANY

Main Office and Works:
CAMDEN, N. J.

New York Office:
420 LEXINGTON AVE.



THE TEA CLIPPER RETURNS

to the China Sea . . .

IN the days of sail, tall-sparred, fine-hulled ships stormed 'round the Horn with China tea for the markets of the world.

Soon a great Dollar Liner, powered with Westinghouse turbine electric drive will enter Chinese ports —her decks lined with passengers, her holds ready to receive the packages of tea swung aboard by her electric cargo winches.

Westinghouse turbine electric drive was chosen for this 'round-the-world liner, because of its high in-built quality, its flexibility, its economy of operation, and, above all, its unfailing reliability, for ships in this service are often far from adequate repair facilities.

So it is, that Westinghouse equipment will return the famous tea clipper of bygone days, in modern form, to the ports of the China Sea.

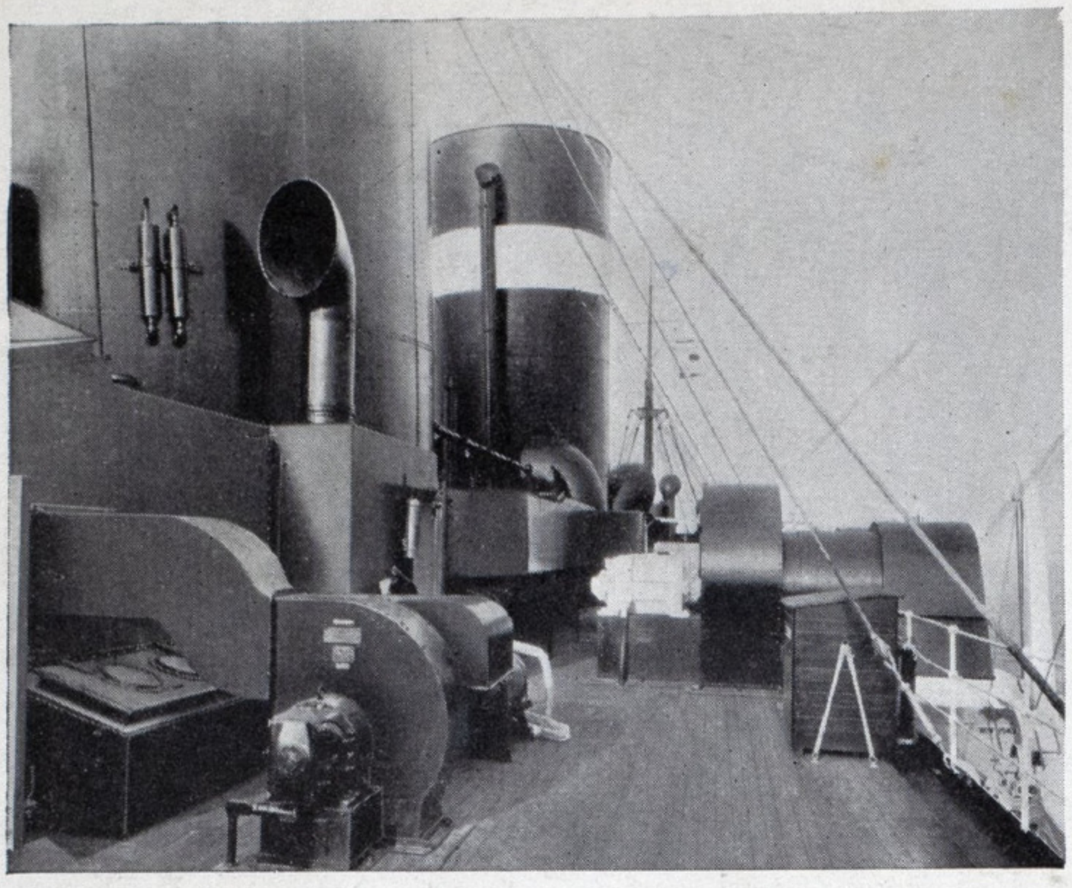
Service, prompt and efficient, in all principal American ports

Westinghouse

WESTINGHOUSE ELECTRIC

T 31690

TUNE IN THE WESTINGHOUSE PROGRAM OVER KDKA, KYW, WBZ AND ASSOCIATED N. B. C. STATIONS SUNDAY EVENINGS.



Do They Sleep Soundly?

When your passengers get up in the morning are they refreshed from a good night's sleep? If they have been sleeping on the boats equipped with Sturtevant ventilating fan, the chances are that the fresh cool sea air has filled them with new zest and vigor.

Sturtevant Ventilating equipment has been the standard by which all other systems have been measured for over fifty years. They are both quiet and efficient. We put into them the experience gained from sixty-six years of building air handling equipment.

A request will bring you complete information on this very important subject of marine ventilation.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

Sales Engineering Offices in Principal Cities

Sturtevant (REG·U·S·PAT·OFF·)

Marine Equipment

Heating and Ventilating Equipment—

Mechanical Draft Equipment—Turbines—Motors—Blowers—

Ventilating Sets—Heaters—Generating Sets—Exhausters

Gasoline and Steam Engines

If You Want The Best Specify

Hyde

S. S. "A. F. HARVEY" owned by Pittsburgh Steamship Co. and built by Great Lakes Engineering Works.

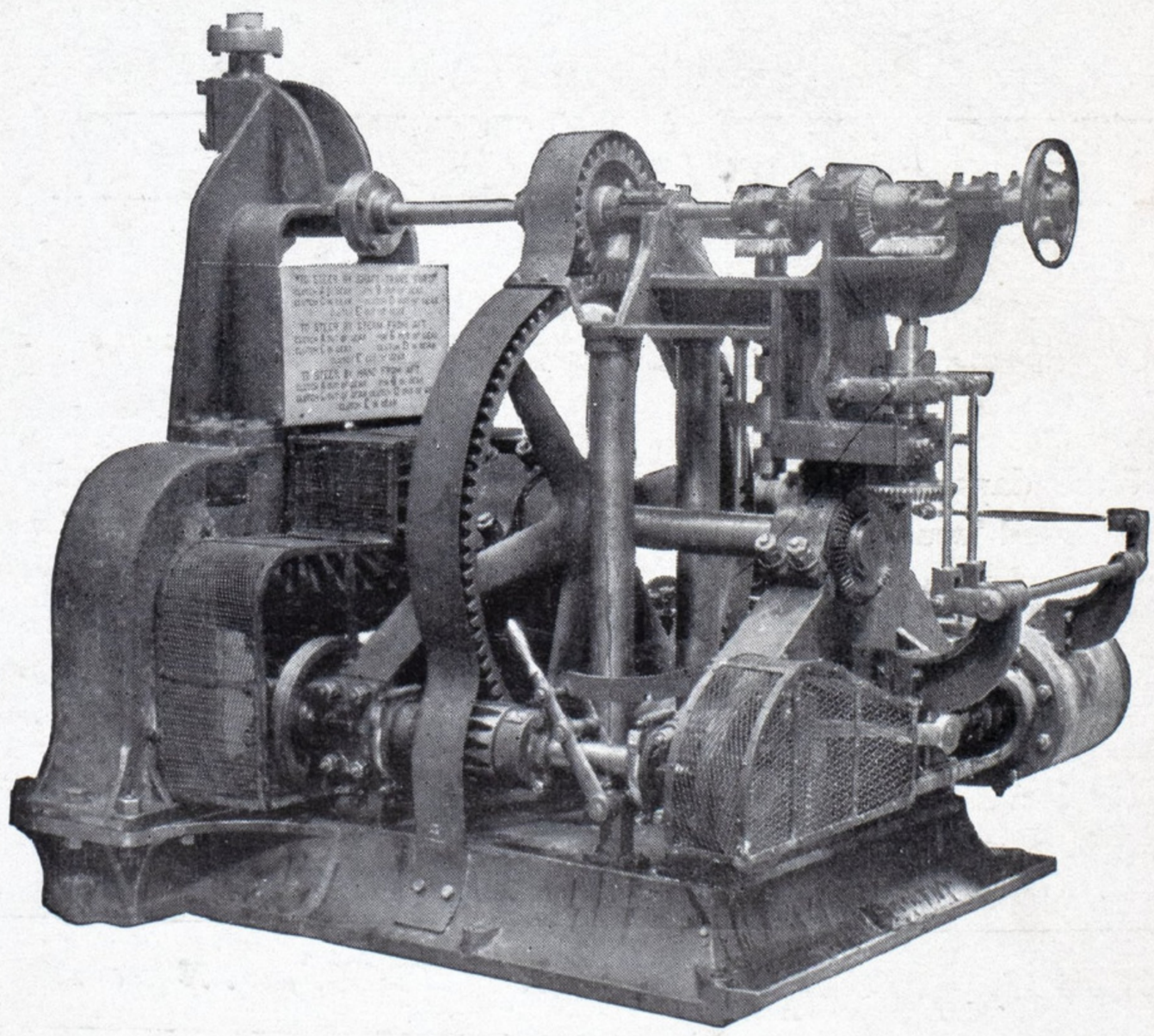
S. S. "B. F. AFFLECK" owned by Pittsburgh Steamship Co. and built by Toledo Shipbuilding Co.

S. S. "S. T. Crapo" owned by Huron Transportation Co. and built by Great Lakes Engineering Works.

These three fine new boats are all equipped with

Hyde

Quadrant Type Steering Gear
Spur Gear Windlass
Mooring Winches
Hatch Winches



HYDE Quadrant Type Steering Gear

Hyde Windlass Company

Bath, Maine